ABSTRACT

Title of Document: SUBSTANCE ABUSE TREATMENT
                              DROPOUT: EXAMINING THE INTERACTING
                              EFFECT OF DISTRESS TOLERANCE WITH
                              INTENTION AND MOTIVATION

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Despite the knowledge that residential substance abuse treatment completion is effective in improving outcomes among chronic substance users, a large proportion of African American residential treatment-seeking substance users experience premature treatment dropout. Previous studies have examined the predictors of early substance abuse treatment dropout; however, a deeper understanding of the conditions that influence treatment dropout among urban African American substance users is limited. Taking the perspectives of the Theory of Planned Behavior, the Stages of Change Model, and the Negative Reinforcement Model, this study examined (1) the interacting effect of intention to complete treatment and distress tolerance on treatment dropout, and (2) the interacting effect of motivation to change substance use behavior and distress tolerance

on treatment dropout in a sample of urban African American treatment-seeking substance users.

Data were collected from 81 African American substance users entering residential substance abuse treatment facility in an urban setting. Participants completed measures assessing intention to complete treatment, motivation to change substance use behavior, and distress tolerance, as well as measures assessing psychiatric comorbidities, impulsivity, previous treatment, treatment barriers, court-mandated treatment, and demographic information. Participants also engaged in a behavioral measure of distress tolerance. Treatment dropout data were obtained using administrative records of the treatment center. Results from logistic regression analyses indicated that only the interaction between motivation and self-reported distress tolerance was significant in predicting the likelihood of treatment dropout after controlling for relevant covariates, including employment, psychiatric comorbidities, and court-mandated treatment status. Probing of this interaction effect showed that higher motivation was significantly associated with decreased likelihood of treatment dropout among substance users with higher distress tolerance, but not in substance users with lower distress tolerance. Findings of the study suggest that higher motivation and higher distress tolerance may be both necessary for reducing the risk of treatment dropout among urban African American treatment-seeking substance users. Interventions to decrease treatment dropout among substance users may benefit by incorporating motivational strategies, such as motivation

interviewing, and distress tolerance skills into their programs to reduce treatment

dropout.

SUBSTANCE ABUSE TREATMENT DROPOUT: EXAMINING THE
INTERACTING EFFECT OF DISTRESS TOLERANCE WITH INTENTION AND
MOTIVATION

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Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2015

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Acknowledgements

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Chapter 1: Introduction

Statement of the Problem: Substance Abuse Treatment Dropout

Chronic substance use is a major public health concern, with 18.6% of the population aged 18 to 25 and 6.3% of the population aged 26 and older meeting the diagnostic criteria for current substance use disorders, including substance abuse or dependence (Substance Abuse and Mental Health Services Administration [SAMHSA], 2012). Substance use disorders, referring to the criteria established in the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association [APA], 2000), reflect the maladaptive patterns of substance use that subsequently lead to impairment and problems at intrapersonal and interpersonal levels. Substance use disorders are associated with detrimental economic, societal, and personal outcomes (Rehm et al., 2009, U.S. Department of Justice, 2011; SAMHSA, 2008). In fact, it has been estimated that substance use disorders cost more than half a trillion dollars a year in medical, economic, criminal, and social costs, and contribute to more than 100,000 deaths in the United States (U.S.; National Institute on Drug Abuse [NIDA], 2010).

Effective substance abuse treatment is one way to address addiction. Substance users, who complete substance abuse treatment, cease their substance use, decrease their criminal activity, and improve their occupational, social, and psychological functioning (Hubbard, Craddock, & Anderson, 2003; McCusker, Stoddard, Frost, & Zorn, 1996; Simpson, Joe, & Brown, 1997; NIDA, 2012). Numerous forms of substance use

treatment are available, including detoxification and medically managed withdrawal,

long-term residential treatment consisting of more than 30 days of non-acute care, short-

term residential treatment consisting of 30 days or fewer of non-acute care, various non-

residential (i.e., outpatient) treatment programs, individualized drug counseling, and

group counseling. Residential substance abuse treatment (long-term and short-term),

which involves living at a treatment facility while undergoing intensive treatment for a

period of time, has been deemed most effective for severe substance use problems

compared to non-residential treatment programs (Harrison & Asche, 1999; Saarnio, 2000;

Saarnio & Knuuttila, 2003). Therefore, completion of a residential treatment program is

regarded as an essential component for improved substance use outcomes.

Despite the knowledge that completion of residential substance abuse treatment

aids in reducing substance use problems among those with severe substance use

disorders, the rate of treatment dropout is alarming and an important public health

problem. Admission records from 34 States indicate that 15.3% of the clients in short-

term residential treatment program and 30.7% of the clients in long-term residential

treatment program do not complete substance abuse treatment (SAMHSA, 2009).

Previous studies on residential treatment-seeking substance users note residential

treatment dropout rates ranging from 12.5% to 25.30% (Lejuez et al., 2008; Tull, Gratz,

Coffey, Weiss, & McDermott, 2013). Further, national data shows that approximately

90.0% of the population that needs substance abuse treatment does not receive any

specialty treatment at drug and alcohol rehabilitation facility, hospital, or mental health

center (Han, Clinton-Sherrod, Gfroerer, Pemberton, & Calvin, 2011). Considering that

only a small proportion of individuals in need of substance abuse treatment actually

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receive treatment, it is imperative to identify factors contributing to treatment dropout and reduce treatment dropout among those entering residential substance abuse treatment.

Numerous studies have been conducted to investigate factors related to substance abuse treatment dropout. Potential predictors of treatment dropout among treatment-seeking substance users include social-cognitive factors (e.g., intention, motivation, distress tolerance; Daughters et al., 2005a; de Leon, Melnick, Kressel, & Jainchill, 1994; de Leon & Jainchill, 1986; Hampton et al., 2011; Zemore & Ajzen, 2014); psychiatric comorbidity (Bornovalova, Lejuez, Daughters, Rosenthal, & Lynch, 2005; Daughters, Sargeant, Bornovalova, Gratz, & Lejuez, 2008; Martinez-Raga, Marshall, Keaney, Ball, & Strang, 2002; Trull, Sher, Minks-Brown, Durbin, & Burr, 2000; Tull & Gratz, 2012), impulsivity (Moeller et al., 2001; Patkar et al., 2004; Taylor, Hiller, & Taylor, 2013), coerced or court-mandated treatment (Maglione, Chao, & Anglin, 2000; Marlowe et al., 2001; Perron & Bright, 2008), substance use severity and demographics, such as gender, age, education level, and income (Choi et al., 2013; Maglione et al., 2000; Martinez-Raga et al., 2002; Greenfield et al., 2007; Saarnio & Knuuttila, 2003; Tull et al., 2013; Turan & Yargic, 2012). However, additional investigation is necessary to examine the interplay of factors associated with residential substance abuse treatment dropout among minority subgroups, especially urban African American substance users.

Substance Abuse Treatment Dropout among African Americans

Epidemiological data indicates that African Americans have a high prevalence of substance use disorders. Recent data from the 2013 National Survey on Drug Use and Health (NSDUH) among persons aged 18 or older indicate that 7.8% of African

Americans endorse substance abuse or dependence in the past year (Center for Behavioral Health Statistics and Quality, 2014). Also, the 2001-2003 data from the National Comorbidity Survey Replication, a nationally representative survey of English-speaking household residents aged 18 and older, show that 10.8% of African Americans report lifetime substance abuse or dependence (Breslau et al., 2006). It has been suggested that minority subgroups are especially vulnerable to substance use and substance use disorders due to their experiences with socioeconomic disparities, such as living in urban, unhealthy areas with high levels of poverty, and low education levels (Broman, Neighbors, Delva, Torres, & Jackson, 2008; Jacobson, Robinson, & Bluthenthal, 2007; SAMHSA, 2008). Consistent with this notion, the NSDUH data from 2005-2009 among individuals who reported illicit drug or alcohol abuse or dependents in the past year show that African American substance dependents have lower socioeconomic status than White substance dependents as measured by percentage of the federal poverty level (Lê Cook & Alegría, 2011). These data implicate that African Americans, particularly those with low socioeconomic status, may be at an increased risk for substance abuse-related problems.

One such problem, and the focus of this dissertation study, is substance abuse treatment dropout among African Americans. In 2013, only 12.9% of African Americans aged 18 and older who needed treatment, as identified by their substance abuse or dependency during the past year, actually received specialty treatment facility (Center for Behavioral Health Statistics and Quality, 2014). Although there is a lack of support for the racial/ethnic disparities between African Americans and Whites in terms of their need and receipt of treatment, evidence suggests that African American substance users may

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be at a greater risk for residential and non-residential substance abuse treatment dropout than Whites (Bluthenthal, Jacobson, & Robinson, 2007; Choi et al., 2013; Jacobson et al., 2007; SAMHSA, 2009). Based on the findings from three private residential treatment facilities that integrated substance abuse and mental health services, the increased risk of treatment dropout among African American substance users remains even after taking individual characteristics into consideration, such as gender, types of substance abuse disorders, and mental health disorders (Choi, Adams, MacMaster, & Seiters, 2013). Further in urban African American treatment-seeking substance users, the rate of treatment dropout has been observed as high as 25.3% (Lejuez et al., 2008), suggesting that up to one-fourth of this population in treatment does not receive adequate treatment.

The risk factors for treatment dropout among urban African American substance users are inconsistent with the risk factors for treatment dropout among White substance users. For example, studies consisting of predominately White substance users have identified substance use severity, gender, age, education, and employment as important predictors of residential substance abuse treatment dropout (Maglione et al., 2000; SAMHSA, 2009). However, substance use severity, gender, age, education level, or employment status are not significant predictors of treatment dropout among urban African American substance users receiving residential treatment (Daughters et al., 2005a; Daughters, Lejuez, Kahler, Strong, & Brown, 2005b; Lejuez et al., 2008). These inconsistent findings across racial/ethnic groups of substance users suggest that more research is needed to examine the underlying factors related to substance abuse treatment dropout among African American treatment-seeking substance users. An in-depth

understanding of the roles of socio-cognitive factors is crucial to guide the development of appropriate intervention to decrease treatment dropout in this population.

Furthermore, the literature on substance abuse treatment regards the first 30 days of substance abuse treatment as the most critical period for retention (Britt, Knisely, Dawson, & Schnoll, 1995; Carroll, 1997; Daughters et al., 2005a; Daughters et al., 2008; de Leon, 1991; Lejuez et al., 2008). Early stages of treatment is marked by difficulty as clients often face challenges adjusting to a structured environment (Bartels & Drake, 1996), while they experience withdrawal symptoms and drug cravings that produce unpleasant and uncomfortable emotions, such as anger, frustration, depression, and guilt (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). In fact, a previous study on urban African American treatment-seeking substance users notes that the vast majority of dropouts (78.0%) occur within the third and the fourth week of residential treatment (Daughters et al., 2005a). Therefore, the identification of the key factors that relate to treatment dropout at an early stage of treatment in African American treatment-seeking substance users is essential to develop targeted interventions aimed at improving substance abuse treatment dropout and, ultimately, long-term outcomes in this marginalized population. Given the public health significance of residential substance abuse treatment for urban African Americans with chronic substance use, and the importance of treatment retention during the early stages of treatment, this dissertation study focused on understanding the factors associated with early treatment dropout among urban African American residential treatment-seeking substance users.

The theoretical framework for the current study arose from three theoretical perspectives, the Theory of Planned Behavior, the Stages of Change Model, and the Negative Reinforcement Model. These theoretical models, along with the empirical evidence from studies performed on treatment-seeking substance users (residential and non-residential), point that the construct of intention from the Theory of Planned Behavior, the component of motivation based on the Stages of Change Model, and the concept of distress tolerance from the Negative Reinforcement Model are important factors for the examination of substance abuse treatment dropout. Each theoretical construct is described below.

Intention. The construct of intention, defined as the readiness to perform a given behavior (Ajzen, 1991), is based on the Theory of Planned Behavior. According to this theory, an individual's action is determined by his/her intention to engage in that behavior, which is a function of attitude, subjective norm, and perceived control regarding the behavior (Ajzen, 1991). This theory has been extensively applied to the study of substance use (Armitage, Conner, Loach, & Willetts, 1999; Gagnon & Godin, 2009; McMillan & Conner, 2003; Orbell, Blair, Sherlock, & Conner, 2001), including substance abuse treatment outcomes (e.g., Kelly, Deane, McCarthy, & Crowe, 2011; Stecker, McGovern, & Herr, 2012; Zemore & Ajzen, 2014).

In the context of substance abuse treatment dropout, the theory suggests that an individual's attitude towards treatment completion, subjective norm regarding treatment completion, and perceived behavioral control over completing treatment predict his/her

level of intention to complete treatment, which in turn predicts treatment completion or dropout from substance abuse treatment. As the construct of intention is proxy to the involvement in a given behavior, only this construct was examined in the current study. Indeed, there is support for a positive relationship between intention to complete substance abuse treatment and actual treatment completion; however, less than one-third of the variance in treatment completion can be explained by intention (Zemore & Ajzen, 2014). As intention to complete treatment does not fully explain treatment completion, an examination of other factors is required to further understand treatment completion or dropout. With that perspective, the importance of a theoretically relevant underlying factor that may modify the relationship between intention to complete treatment and treatment dropout is yet to be investigated.

Motivation. The component of motivation, referring to the internal recognition of the need to change (de Leon et al., 1994), is based on the Stages of Change Model. This model posits that a behavior change occurs over six steps: pre-contemplation, contemplation, preparation, action, maintenance, and termination (DiClemente & Prochaska, 1998; DiClemente, Schlundt, & Gemmell, 2004; Prochaska & Norcross, 2001). The pre-contemplation stage reflects that an individual is not ready to change his/her problem behavior; the contemplation stage refers to an individual getting ready, and the preparation stage corresponds to the ready stage, followed by action of the changed behavior, maintenance of the changed behavior, and termination of the problem behavior. This perspective is heavily used in the substance use research (Belding, Iguchi, & Lamb, 1997; de Leon et al., 1994; Heather & McCambridge, 2013; Rosen, Hiller, Webster, Staton, & Leukefeld, 2004).

Research shows that higher motivation, corresponding to the pre-contemplation, contemplation, and preparation stages of the model, increases the likelihood of substance abuse treatment entry and completion (Cunningham, Sobell, Sobell, & Gaskin, 1994; Hampton et al., 2011; Rosen et al., 2004). Higher level of motivation is also positively associated with treatment compliance, greater engagement, attendance, and retention of substance abuse treatment program (Cunningham et al., 1994; Ryan, Plant, & O'Malley, 1995; Simpson, Joe, Rowan-Szal, & Greener, 1995). Although a great deal of support exists for motivation as a significant predictor of treatment outcome, it has yet to be examined in relation to a theoretical underlying factor that may modify the relationship between motivation and treatment dropout.

Distress Tolerance. The construct of distress tolerance, defined either as an individuals' self-reported or perceived ability to tolerance distress (Simons & Gaher, 2005), or as an individual's behaviorally assessed persistence on a goal-oriented task while he/she faces distress (Daughters et al., 2005a), is based on the Negative Reinforcement Model. The Negative Reinforcement Model of addiction posits that the motivational basis for substance use is the reduction or avoidance of negative affective states (Baker et al., 2004). Specifically, substance use provides perceived and/or actual relief from negative affective states, such as feelings of irritability, anxiety, stress, and depression, thereby reinforcing this behavior and increasing the likelihood of substance use in the future. This perspective may be extended to the study of substance abuse treatment dropout. Research shows that substance users in residential settings experience unpleasant and uncomfortable emotions due to their experiences with difficulties adjusting to a structured environment, withdrawal symptoms and drug cravings (Bartels

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& Drake, 1996; Baker et al., 2004). As such, a substance user may choose to leave the treatment facility to avoid experiences with negative affect, despite having more favorable intention to complete treatment or higher motivation to change substance use behavior.

Distress tolerance, the measurable construct, may resemble the ability to cope with negative affect and stress experienced by treatment-seeking substance users in residential substance abuse treatment. Distress tolerance is regarded as an important component of emotion regulation (Leyro, Zvolensky, & Bernstein, 2010), which impacts the behavior of addicted individuals, including initiation of substance use, maintenance of substance use, and relapse during periods of abstinence (Murphy, Taylor, & Elliott, 2012). Accordingly, distress tolerance may be a relevant condition modifying the relationship between intention and treatment dropout, as well as motivation and treatment dropout. In order words, an individual with more favorable treatment intention or motivation may be able to successfully complete his/her substance abuse treatment if he/she exhibits higher distress tolerance, but this may not be the case for someone with lower distress tolerance.

Taken together, the construct of intention from the Theory of Planned Behavior, the component of motivation from the Stages of Change Model, and the construct of distress tolerance based on the Negative Reinforcement Model provide the conceptual basis for this study. Conceptually, more favorable intention to complete treatment and higher motivation to change substance use behavior relate to decreased likelihood of treatment dropout among substance users. However, given that substance users in

residential treatment often encounter difficulties in dealing with negative affect pertaining to their difficulties adjusting to the new environment while experiencing withdrawal symptoms and cravings, their individual-level propensity to tolerate distress may moderate the relationship between intention and treatment dropout, as well as motivation and treatment dropout. Although the conditional effect of distress tolerance on (a) intention and treatment dropout and (b) motivation and treatment dropout is supported by theories and past research, these relations have not been previously investigated.

Thus, the purpose of the current study was twofold: (1) to examine whether distress tolerance (self-reported and behavioral) moderated the relation of intention with treatment dropout, and (2) to examine whether distress tolerance (self-reported and behavioral) moderated the relation of motivation and treatment dropout among urban African American treatment-seeking substance users.

Research Aim and Hypotheses

Aim 1. To examine whether the different modes of distress tolerance (self-reported and behavioral) modify the relation of intention to complete treatment with treatment dropout among urban African American treatment-seeking substance users.

Hypothesis 1.1: Urban African American treatment-seeking substance users with more favorable intention towards treatment completion and higher self-reported distress tolerance are more likely to complete treatment than those with more favorable intention but lower self-reported distress tolerance.

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Hypothesis 1.2: Urban African American treatment-seeking substance users with more favorable intention towards treatment completion and higher behavioral distress tolerance are more likely to complete treatment than those with more favorable intention but lower behavioral distress tolerance.

Aim 2. To investigate whether the different modes of distress tolerance (self-reported and behavioral) modify the relation of motivation to change substance use behavior with treatment dropout among urban African American treatment-seeking substance users.

Hypothesis 2.1: Urban African American treatment-seeking substance users with higher motivation and higher self-reported distress tolerance are more likely to complete treatment than those with higher motivation but lower self-reported distress tolerance.

Hypothesis 2.2: Urban African American treatment-seeking substance users with higher motivation and higher behavioral distress tolerance are more likely to complete treatment than those with higher motivation but lower behavioral distress tolerance.

Figure 1 below illustrates the conceptual framework of the dissertation study.

Figure 1. Distress tolerance moderating the effects of intention and motivation on treatment dropout.
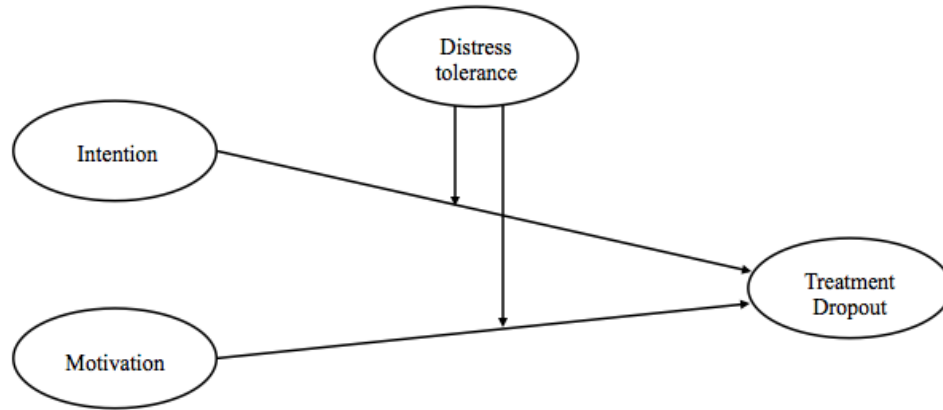
Definitions of Terms

Axis I disorders: Mood disorders (e.g., major depressive disorder and bipolar disorder), anxiety disorders (e.g., panic disorder, social phobia, generalized anxiety disorder, and posttraumatic stress disorder), and psychotic disorders as defined in the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; APA, 2000).

Axis II disorders: Borderline personality disorder and antisocial personality disorder, as defined in the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; APA, 2000).

Barriers: Comprised of four factors that relate to treatment outcome, including absence of problem, negative social support, fear of treatment, and privacy concerns (Rapp et al., 2006).

Behavioral distress tolerance: The ability to persist in goal directed activity while experiencing emotional distress (Daughters et al, 2005a; MacPherson et al., 2010).

Dropout: Non-completion of treatment due to voluntary withdrawal from the program or termination due to disciplinary reasons (e.g., use of any drug while in treatment).

Impulsivity: Assessment of four different personality pathways to impulsive behavior, including (lack of) premeditation, negative urgency, positive urgency, and (lack of) perseverance (Cyders, Littlefield, Coffey, & Karyadi, 2014).

Intention to complete treatment: Readiness to perform a given behavior as a function of attitude towards the behavior, subjective norm regarding the behavior, and perceived behavioral control over the behavior (Ajzen, 1991).

Motivation: Internal recognition of the need to change a behavior based on the realization that a behavior has negative consequences on domains of life and the desire to seek help (de Leon et al., 1994).

Residential treatment: Living at a treatment facility while undergoing intensive treatment for substance abuse or dependence, either short-term (30 days or less) or long-term (more than 30 days; SAMHSA, 2009).

Self-reported distress tolerance: Perceived ability to tolerance distress or discomfort (Simons & Gaher, 2005).

Substance abuse disorder: Endorsement of at least one of the following symptoms: recurrent substance use resulting in a failure to fulfill major role obligations at work,

school, or home; recurrent substance use in situations in which it is physically hazardous; recurrent substance-related legal problems; and continued substance use despite persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (APA, 2000).

Substance dependence disorder: Endorsement of three of the following symptoms: increased tolerance to substance; withdrawal symptoms; substance use in larger amounts than intended; persistent desire or unsuccessful efforts to cut down or control substance use; involvement in chronic behavior to obtain the substance, use the substance, or recover from its effects; reduction or abandonment of social, occupational or recreational activities because of substance use; and use of substances despite a persistent or recurrent physical or psychological problem caused or exacerbated by the substance (APA, 2000).

Chapter 2: Review of the Literature

To support the interacting effects of intention with distress tolerance and

motivation with distress tolerance on substance abuse treatment dropout, this chapter

provides an in depth review of the relevant published literature. The following literature

review covers the important study factors, namely intention, motivation, and distress

tolerance (self-reported and behavioral), as they may relate to substance abuse treatment

dropout. Then, potential confounders to substance abuse treatment dropout are identified,

including psychiatric comorbidities, impulsivity, court-mandated treatment, and other

individual characteristics.

Main Independent Variable: Intention

Intention refers to the readiness to perform a given behavior based on an

individual's attitude, subjective norm, and perceived behavioral control regarding that

behavior (Ajzen, 1991). Previous studies have heavily employed this theory to examine

substance use (Armitage et al., 1999; Gagnon & Godin, 2009; McMillan & Conner,

2003; Orbell et al., 2001), and particularly, substance abuse treatment outcomes (Kelly et

al., 2011; Stecker et al., 2012; Zemore & Ajzen, 2014). As mentioned above, the Theory

of Planned Behavior suggests that an individual's attitude towards treatment completion,

subjective norm regarding treatment completion, and perceived behavioral control over

treatment completion predict his/her intention to complete treatment, which consequently

predicts the actual treatment completion. To date, only one study has directly examined

intention towards substance abuse treatment completion and the actual treatment completion (Zemore & Ajzen, 2014).

Traditionally, the assessment of readiness for treatment is based on the Stages of Change Model (DiClemente & Prochaska, 1998; Prochaska & Norcross, 2001), which posits that a behavior changes through six stages: pre-contemplation, contemplation, preparation, action, maintenance, and termination (DiClemente et al., 2004). This model is described in Chapter 1, and literature on the Stages of Change is further discussed below. Although, conceptually, the constructs of intention and readiness are similar such that intention refers to "a person's readiness to perform a given behavior" (Ajzen, 1991), there are limitations in the scales assessing readiness based on the Stages of Change Model. In particular, (1) the instruments developed to capture readiness of change are often not generalizable across treatment settings (Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003; McConnaughy, Prochaska, & Velicer, 1983), (2) these measures do not capture the cognitive precursors to readiness (Zemore & Ajzen, 2014), and (3) they contain a lack of regard to the fluidity of the Stages of Change, as stages may change throughout treatment.

Given the limitations of the measures assessing readiness to change based on the Stages of Change, Zemore and Ajzen (2014) recently developed a measurement tool to assess intention based on the Theory of Planned Behavior. This new scale serves as a concise and valid measure of intention to complete treatment, which was appropriate for the current study to investigate treatment dropout among urban African American treatment-seeking substance users. The assessment of intention provides a better indicator

of treatment readiness at the initial phase of treatment. Indeed, Zemore and Ajzen (2014) have examined data from substance users entering a non-residential treatment program and have found that more favorable intention to complete treatment predicts significantly higher odds of treatment completion in substance users receiving treatment in two large cities with treatment length contracts ranging from 8 weeks to 12 weeks. These findings are statistically significant even after adjusting for clinical and demographic confounders. As stronger support exists for the inclusion of intention as the predictor of substance abuse treatment dropout, the current study created a modified version of the measure assessing intention to complete substance abuse treatment. However, given the conceptual basis, this study examined the interacting effect of intention and distress tolerance to study treatment dropout.

Main Independent Variable: Motivation

Motivation, defined as the internal recognition of the need to change (de Leon et al., 1994), is based on the Stages of Change perspective (DiClemente & Prochaska, 1998; Prochaska & Norcross, 2001). The Stages of Change perspective is extensively applied in the study of substance abuse treatment outcomes, such as treatment engagement, completion, and abstinence (Belding et al., 1997; de Leon et al., 1994; Heather & McCambridge, 2013; Joe, Simpson, & Broome, 1999). For example, a large study shows that an individual's stage upon entering treatment serves as a significant predictor of 90 days treatment completion in a long-term residential treatment, even after adjusting for demographics and background information (Joe et al., 1999). Importantly, specific components based on the Stages of Change, such as circumstances or reasons that

influence people to seek treatment, motivation or inner reasons for change through treatment, readiness or perceived need for treatment, and suitability of treatment or perception of appropriateness of the treatment, have also been examined as predictors of residential substance abuse treatment dropout (de Leon et al., 1994; de Leon & Jainchill, 1986). In particular, the positive relationship of higher motivation and improved treatment outcome is widely noted.

Motivation corresponds to the pre-contemplation, contemplation, and preparation stages in the Stages of Change Model (Rosen et al., 2004). Individuals in the pre-contemplation stage have no desire to change their substance use behavior, and may have entered into treatment facility due to external pressure, such as court-mandated treatment. Individuals in the contemplation stage acknowledge their substance use problem and want to their behavior. However, they may not have the confidence in their ability to change their substance use behavior or seek adequate treatment. The preparation stage is regarded as a transition stage from between contemplation and action. In this stage, individuals are taking small goal-oriented steps to change their substance use behavior. Motivation is driven by (1) an individual's realization that the problem behavior has negative consequences on different domains in life and (2) an individual's desire to seek help (Rosen et al., 2004).

Higher motivation is linked to substance abuse treatment entry and completion (Cunningham et al., 1994; de Leon & Jainchill, 1986; de Leon et al., 1994; Hampton et al., 2011; Jakobsson, Hensing, G., & Spak, 2005; Rosen et al., 2004). As an example, pretreatment motivation to quit smoking is identified as a significant predictor of 1-month

smoking abstinence, accounting for the nicotine dependence severity (Rohsenow et al., 2015). Motivation is strongly related improved substance use outcomes (de Leon, Melnick, Thomas, Kressel, & Wexler, 2000; DiClemente, Bellino, & Neavins, 1999; Gregoire & Burke, 2004), including greater treatment engagement, attendance, and retention (Ryan et al., 1995; Simpson et al., 1995), as well as greater personal confidence and commitment to the treatment process (Broome, Simpson, & Joe, 1999).

Moreover, findings from a study conducted on substance users with residential stay between 15 and 24 months show that higher motivation relates to 30-day treatment completion, as well as 12-month treatment retention in two large separate samples of substance users (de Leon et al., 1994). It is highlighted that problem recognition and desire for help are important for cognitive indicators of therapeutic engagement, such as confidence and commitment to treatment (Rosen et al., 2004). Therefore, higher motivation is important for improved treatment outcomes. Although a strong support is available for motivation associated with reduced likelihood of substance abuse treatment dropout, given the conceptual basis, the current study examined the interacting effect of motivation and distress tolerance to study treatment dropout.

Moderator: Distress Tolerance

Distress tolerance, defined as an individual's self-reported perceived ability to experience and endure negative emotional states (Simons & Gaher, 2005), or the behavioral ability to persist in goal-directed activity while experiencing affective distress (Daughters et al., 2005a), is identified as a significant factor for substance use outcomes, including frequency of substance use (Howell, Leyro, Hogan, Buckner, & Zvolensky,

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2010; Marshall et al., 2008; O'Cleirigh, Ironson, & Smits, 2007; Quinn, Brandon, & Copeland, 1996; Simons & Gaher, 2005) and relapse to substance use (Abrantes et al., 2008; Brown, Lejuez, Kahler, & Strong, 2002; Brown et al., 2009; Brandon et al., 2003). Further, low distress tolerance is linked to a shorter duration of most recent drug abstinence attempt among adult illegal substance users (Daughters et al., 2005b) and early dropout from residential substance abuse treatment (Daughters et al., 2005a).

Distress tolerance contains different modes of measurement, including self-reported and behavioral, with each consisting of physical and psychological assessment of distress tolerance (review in Magidson, Ali, Listhaus, & Daughters, 2013). In other words, distress tolerance can be regarded as: (1) self-reported physical distress tolerance, (2) self-reported psychological distress tolerance, (3) behavioral physical distress tolerance, and (4) behavioral psychological distress tolerance. In fact, these different methods capture different aspects of distress tolerance (Leyro et al., 2010; McHugh et al., 2011). Specifically, self-reported distress tolerance measures perceived ability to tolerate physical/psychological distress, while behavioral distress tolerance calculates the actual persistence in a goal-oriented task in the face of physical/psychological distress (Leyro et al., 2010; Simons & Gaher, 2005; Tull & Gratz, 2012).

Based on the multiple ways of operationalizing distress tolerance, specific instruments have been developed to measure specific aspect of distress tolerance. For example, Discomfort Intolerance Scale (Schmidt, Richey, & Fitzpatrick, 2006) assesses self-reported physical distress tolerance, Distress Tolerance Scale assesses self-reported psychological distress tolerance (Simons & Gaher, 2005), Breath-Holding Challenge

(Hajek, Belcher, & Stapleton, 1987) captures behaviorally assessed physical distress tolerance, and Computerized Paced Auditory Serial Addition Task (PASAT-C; Lejuez, Kahler, & Brown, 2003) indexes behavioral psychological distress tolerance. Evidence indicates that these various methods of distress tolerance are weakly related. Although self-reported distress tolerance measures are often highly correlated with one another, and behavioral distress tolerance measures are often highly correlated with one another, self-reported and behavioral distress tolerance measures display weak association (McHugh et al., 2011). This suggests that an individual's perceived distress tolerance does not perfectly map onto his/her actual ability to tolerate distress. Given that different methods of distress tolerance provide information on distinct types of distress tolerance, both self-reported and behavioral distress tolerance were assessed in the current study in the context of intention and motivation.

However, based on previous research, only psychological distress tolerance was examined in the study. In a study conducted on urban African American treatment-seeking users by Daughters and colleagues (2005b), results noted that recent drug and alcohol abstinence attempt on at least a weekly basis prior to entering treatment significantly relates to low persistence on a psychological distress tolerance task, adjusting for demographics, substance use level, and negative mood. The study indicates that low tolerance of psychological distress is a risk factor for adverse outcomes due to substance dependence. Moreover, a previous study identified a direct relationship between low distress tolerance and substance abuse treatment dropout. The findings of a study by Daughters and colleagues (2005a) show that low *psychological* distress tolerance is a significant predictor of early treatment dropout (i.e., dropping out prior to

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30 days in treatment) among adult substance users receiving treatment at a residential drug treatment facility. In addition, the results also show that low *physical* distress tolerance does not relate to early treatment dropout.

Even though a positive relationship between low distress tolerance and increased likelihood of treatment dropout is highlighted in literature, distress tolerance was regarded as a moderator in the relationship of intention and treatment dropout, as well as motivation and treatment dropout, in the current study based on the theoretical support. However, previous research provides an indication of the type of interaction expected with distress tolerance, suggesting that psychological distress tolerance may be more powerful than physical distress tolerance in assessing substance use outcomes (Daughters et al., 2005a; Daughters et al., 2005b). Due to limited resources, the current study only investigated psychological distress tolerance. Specifically, psychological distress tolerance was assessed using one form of self-reported distress tolerance measure and one form of behavioral distress tolerance task.

Although no previous study has explored the modifying effect of distress tolerance in the relationship between intention and substance use outcome or the relationship between motivation and substance abuse outcome, a few studies have investigated the conditional effect of distress tolerance in the context of negative affect, such as aggression and depression, and adverse substance use outcomes, such as greater alcohol use problems (Ali, Ryan, Beck, & Daughters, 2013; Gorka, Ali, & Daughters, 2012). Moreover, one study that has examined the underlying conditional effect of distress tolerance on substance abuse treatment dropout indicate that among men with

low distress tolerance, a current diagnosis of posttraumatic stress disorder is associated with less likelihood of residential substance abuse treatment completion (Tull et al., 2013), which suggests that posttraumatic stress disorder and low distress tolerance among men is a risk factor for treatment dropout. In another study, depressed women with low distress tolerance, but not high distress tolerance, are identified as a subgroup with an increased likelihood of greater substance use problems (Ali, Seitz-Brown, & Daughters, 2015). These studies that have explored the interacting effect of distress tolerance with other relevant factors on substance abuse problems and outcomes provide support for distress tolerance as having an intricate relationship with other socio-cognitive components. Therefore, findings from the previous studies, coupled with the conceptual basis, provided support for distress tolerance serving as a conditional risk factor for substance abuse treatment dropout.

Potential Confounder: Psychiatric Comorbidities

The presence of substance use disorders and psychiatric disorders comorbidity is evident in the literature (Choi et al., 2013; Riggs, Levin, Green, & Vocci, 2008; SAMHSA, 2010), and particularly among treatment-seeking substance users (Banducci et al., 2013; Bradizza, Stasiewicz, & Paas, 2006; Chen et al., 2011; Mangrum, Spence, & Steinley-Bumgarner, 2006). One study on the co-occurring psychiatric disorders with substance use among urban African American treatment-seeking substance users show that more than half of the clients experience current comorbid psychiatric disorder on Axis I psychiatric disorders, such as current mood disorder, anxiety disorder, and psychotic symptoms, and Axis II psychiatric disorders, such as antisocial personality

disorder and borderline personality disorder (Chen et al., 2011). Furthermore, approximately one-third of the clients exhibit at least two psychiatric disorders. Findings of that study also indicate that individuals with substance dependence are three times more likely to have a psychiatric disorder compared to individuals without substance dependence. The previous study underscores that psychiatric disorders are elevated in urban African American treatment-seeking substance users.

Several studies suggest the importance of considering Axis I disorders in substance abuse treatment dropout. Among urban African American treatment-seeking substance users, treatment dropout significantly differs with respect to depressive symptoms, controlling for clients' contract duration (Lejuez et al., 2008). In addition, a study conducted by Daughters and colleagues (2009) to explore demographic, psychiatric diagnoses, and substance use differences between treatment-seeking substance users who prematurely drop out of treatment as opposed to those who complete treatment, indicate that there is a significant link between social phobia disorder and substance abuse treatment dropout. However, the relation across all Axis I disorders and treatment dropout is not supported in the previous study. Another study shows that major depressive disorder significantly increases the odds of residential substance abuse treatment dropout, even after accounting for court-mandated treatment status and contract duration (Tull & Gratz, 2012). Taken together, previous studies provided considerable support for regarding Axis I disorders as potential confounders in the current study.

In addition to the Axis I disorders, previous studies report that Axis II disorders, particularly antisocial personality disorder and borderline personality disorder, are

significantly associated with substance abuse treatment dropout (Bornovalova et al., 2005; Daughters et al., 2008; Martinez-Raga et al., 2002; Trull et al., 2000; Tull & Gratz, 2012). Findings from a study on urban African American treatment-seeking users indicate that substance users with antisocial personality disorder who enter treatment voluntarily are at an increased risk for dropping out of treatment within 30 days compared to substance users with non-antisocial personality disorder who enter treatment voluntarily (Daughters et al., 2008). Similarly, the risk of treatment dropout is greater in substance users with antisocial personality disorder who are court-mandated to attend treatment relative to substance users with non-antisocial personality disorder who are court-mandated to attend treatment (Daughters et al., 2008). This relationship is observed even after accounting for substance users' income, substance use disorder, and contract duration.

Additional support exists for the comorbid Axis II disorder and substance use disorder in relation to treatment dropout. Male residential treatment-seeking substance users with borderline personality disorder are significantly more likely to drop out of treatment than substance users without borderline personality disorder, adjusting for court-ordered treatment status, contract duration, and major depressive disorder (Tull & Gratz, 2012). Substance users with borderline personality disorder are more likely to drop out due to engagement in treatment-interfering behaviors (e.g., using substances, breaking rules at the treatment facility, violent or aggressive behavior, selling of substances, or having sexual relations with other patients), as opposed to voluntary withdrawal from treatment.

Given the findings of the previous studies, Axis I and Axis II disorders (e.g., antisocial personality disorder and borderline personality disorder) seemed to be potential factors associated with substance abuse treatment dropout. However, some studies indicate non-significant associations between Axis I disorders and treatment dropout, and Axis II disorders and treatment dropout (Daughters et al., 2005a; Daughters et al., 2009). Despite some discrepant findings, there is ample support for regarding psychiatric comorbidities as a confounder in the current study. Accordingly, the following disorders were included in the study: current major depressive disorder, current bipolar I disorder, current psychotic symptoms, current panic disorder, current social phobia, current obsessive compulsive disorder, current posttraumatic stress disorder, current generalized anxiety disorder, borderline personality disorder, and antisocial personality disorder.

Potential Confounder: Impulsivity

The prevalence of impulsivity is well known among substance users (Murphy et al., 2012; Quinn & Harden, 2013). In fact, studies have repeatedly associated impulsivity with substance use vulnerability, frequency, severity (e.g., self-reported average daily drug use and drug withdrawal symptoms), dependence (Allen, Moeller, Rhoades, & Cherek, 1998; Monterosso, Ehrman, Napier, O'Brien, & Childress, 2001; Petry, 2001; von Diemen, Bassani, Fuchs, Szobot, & Pechansky, 2008), and poor substance abuse treatment outcomes (Stevens et al., 2014). Impulsivity is noted as a significant factor associated with both the initiation and maintenance of substance abuse (Moeller & Dougherty, 2002; Quinn & Harden, 2013), as well as difficulties in achieving and maintaining abstinence (Patkar et al., 2004; Stevens et al., 2014).

Moreover, impulsivity is identified as a significant factor related to treatment dropout (Moeller et al., 2001; Patkar et al., 2004; Taylor et al., 2013). Specifically, pre-treatment impulsivity level associates with days in treatment in African-American cocaine-dependent patients entering a 12-week, intensive treatment program (Patkar et al., 2004). Further, impulsivity significantly correlates with self-reported average daily cocaine use, as well as cocaine withdrawal symptoms among treatment-seeking cocaine users (Moeller et al., 2001). In the study conducted by Moeller and colleagues (2001), higher baseline impulsivity is identified as a significant risk factor for shorter period of treatment retention among substance users receiving 12-week double-blind placebo controlled trial of buspirone and group therapy. Based on these findings, impulsivity was included as a potential confounder related to substance abuse treatment dropout.

Potential Confounder: Court-Mandated Treatment

Epidemiological data has observed the association between court-mandated treatment status and substance abuse treatment dropout. Assessment of the 2004-2009 national data shows that among individuals who meet the criteria for any substance use disorder, approximately one-third of Whites, African Americans, and Latinos with criminal history receive substance abuse treatment (Lê Cook & Alegría, 2011), and the relationship between court-mandated treatment status and substance abuse treatment is especially notable in African American substance users. Urban African American treatment-seeking substance users with court-mandated treatment status endorse less experiences with previous treatment for psychiatric or substance use disorders (residential, non-residential, or 12-Step group attendance) compared to urban African

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American treatment-seeking substance users with voluntary status (Banducci et al.,
2013). Research also shows that substance users with court-mandated treatment status are
more likely to comply and complete treatment than substance users with voluntary status
(Daughters et al., 2008; Daughters et al., 2009; Lejuez et al., 2008; Maglione et al., 2000;
Marlowe et al., 2001; Perron & Bright, 2008).

Although there is a strong support for regarding court-mandated treatment status
as a significant factor related to substance abuse treatment dropout, one study on urban
African American treatment-seeking substance users did not support this relationship
(Daughters et al., 2005a). There are differences in individual characteristics between
those who voluntarily attend treatment than those who are court-mandated to attend
treatment, which may explain the inconsistent finding of the previous study with the
extant literature. For example, substance users who voluntarily elect to receive treatment
evidence more severe problems, including psychiatric problems, compared to substance
users who are court-mandated to receive treatment. Specifically, substance users who
voluntarily attend treatment have higher rates of mood disorders, major depressive
disorder, generalized anxiety disorder, and borderline personality disorder, alcohol
dependence, and cocaine dependence (Banducci et al., 2013). With the exception of one
study, clear evidence is available for regarding court-mandated treatment status as a
potential confounder. Court-mandated treatment status, therefore, was included as a
confounder in the study.

Literature identifies the importance of previous treatment, substance use severity and demographic characteristics, such as gender, age, education level, and income, in the substance abuse treatment dropout. With regard to previous treatment, some evidence suggests that receipt of previous treatment significantly increases the likelihood of treatment completion (Maglione et al., 2000), while some data indicates that the number of previous treatment episodes does not relate to treatment dropout (SAMHSA, 2009). This discrepancy in the significance of previous treatment in the assessment of substance abuse treatment dropout may be due to different modes of measuring previous treatment, which needs to be further explored in research. Further, research indicates a positively significant relationship between higher level of substance use and substance abuse treatment dropout (Maglione et al., 2000; Joe et al., 1999).

Moreover, extant research on various forms of substance abuse treatment, including both residential and non-residential, show inconsistent findings as to whether there are gender differences between women and men with regard to treatment dropout (Greenfield et al., 2007), with some studies finding that women are more likely than men to dropout of substance abuse treatment (Arfken, Klein, di Menza, & Schuster, 2001; King & Canada, 2004; McCaul, Svikis, & Moore, 2001; Petry & Bickel, 2000; Sayre et al., 2002), some showing that men are more likely than women to drop out of treatment (Maglione et al., 2000), and some indicating no gender differences in terms of treatment retention or length of stay (Green, Polen, Lynch, Dickinson, & Bennett, 2004; Mertens & Weisner, 2000; Veach, Remley, Kippers, & Sorg, 2000). As for age, research shows that

substance users who are younger are more likely to drop out from substance abuse

treatment compared to substance users who are older (Choi et al., 2013; Martinez-Raga et

al., 2002; Saarnio & Knuuttila, 2003; Tull et al., 2013). In terms of education level,

substance users with less than a high school education are more likely to drop out of

treatment than substance users with some college education (SAMHSA, 2009).

Moreover, unemployment serves as a significant risk factor of residential substance abuse

treatment dropout (SAMHSA, 2009). However, these findings are not based on urban

minority treatment-seeking substance users, especially African American substance users,

who were the focus in the current study.

By contrast, research on urban African American treatment-seeking substance

users shows that there are little demographic differences between those who complete

treatment and those who dropout of treatment. Studies that have examined treatment

dropout among urban African American treatment-seeking substance users find a lack of

support for substance use severity, gender, age, education level, or employment status

differences between those who dropout versus those who complete treatment (Daughters

et al., 2005a; Daughters et al., 2005b; Lejuez et al., 2008). Based on the findings from the

population of interest, less support was available to consider substance use severity and

demographic characteristics as significant risk factors associated with substance abuse

treatment dropout. Nonetheless, substance use severity and demographic information

were collected in the current study to replicate the findings of previous studies. In

addition, information on demographic characteristics was collected to inform the future

investigators about the generalizability of the study findings and provide appropriate

future directions. Also, the associations of previous substance abuse treatment and

treatment barriers, such as absence of problem, negative social support, fear of treatment, and privacy concerns (Rapp et al., 2006), with substance abuse treatment dropout were explored in this study.

Summary of the Literature Review

Review of the literature indicates that intention and motivation are significant predictors of treatment dropout, but the conditions under which intention and motivation affect treatment dropout have not been previously examined. Psychological distress tolerance is regarded as an important factor for substance abuse treatment dropout as it relates to persistence through the most difficult early stages of treatment and may explain the condition under which individuals with favorable intention and high motivation complete or not complete substance abuse treatment. Thus, the role of self-reported and behavioral distress tolerance were investigated in the current study, as they may explain the underlying condition related to intention and motivation in predicting the likelihood of treatment dropout among urban African American treatment-seeking substance users. In the current study, relevant confounders were identified and adjusted in the analyses to study likelihood of treatment dropout.

Chapter 3: Methodology

Participants

The study was conducted with a sample of 86 substance users at a residential treatment center. Participants were recruited from the Salvation Army Harbor Light residential treatment center in Northeast Washington, DC. This treatment center offered various contract durations determined at admission, including 28 days, 30 days, 60 days, 90 days, and 180 days. Treatment at this facility consisted of several strategies adopted from Alcoholics Anonymous and Narcotics Anonymous, as well as group sessions that focused on relapse prevention and functional analysis. Prior to coming to this treatment facility, clients were required to abstain from any substance use for at least three days, and urine samples were collected upon entry to verify clients' substance use status. If needed, clients had to complete a detoxification program prior to entry at the treatment center. This process ensured that acute drug effects did not influence the participants' scores on the testing. At the center, clients were required to maintain complete abstinence from drugs and alcohol, and regular drug testing was conducted. Approximately during the first half of the data collection, clients were allowed to smoke cigarettes while they stay at the center. A change is policy at the treatment center occurred mid-way through the study, which prohibited the use of cigarettes. Any use of substances was grounds for dismissal from the center. Aside from the required appointments (e.g., physician visits) and scheduled activities (e.g., group retreats), clients were not allowed to leave the center during their treatment.

Procedure

This study examined (1) the moderating role of distress tolerance (self-reported and behavior) on the relationship between intention to complete substance abuse treatment and treatment dropout, and (2) the moderating role of distress tolerance (self-reported and behavior) on the relationship between motivation to change substance use behavior and treatment dropout.

Each week during recruitment for the study, new clients were assessed on their eligibility using the intake screening measures discussed below. Inclusion criteria included (1) African American treatment-seeking substance user, (2) self-reported minimum of 18 years of age, and (3) self-reported ability to speak and read English sufficiently to complete study procedures. The only exclusion criterion included (1) any diagnosed psychotic symptoms in the past twelve months that potentially affected responses on the self-report measures and performance on the behavioral task assessing distress tolerance. Participants were recruited 10 days within treatment entry at the center.

As a standard practice, all clients completed an intake-screening interview administered by doctoral-level graduate students and senior research staff within one week of their entry into the treatment center. Specifically, all clients entering the Salvation Army Harbor Light treatment were assessed on Axis I disorders, including current major depressive disorder, bipolar disorder, panic disorder, social anxiety disorder, generalized anxiety disorder, posttraumatic stress disorder, psychotic disorders, and substance use dependence, as well as antisocial personality disorder and borderline personality disorder under Axis II using the Structured Clinical Interview for DSM-IV

(SCID-IV; First, Spitzer, Gibbon, & Williams, 1995). Clients also provided information

on the Demographic Questionnaire, which consisted of gender, race, age in years,

employment status, monthly income, court-mandated treatment status, and their past year

frequency of substance use on each type of substance, including cannabis, alcohol,

cocaine, stimulants, sedatives, opioids, hallucinogens (other than PCP), PCP, or

inhalants. At the end of the interview, clients were invited to take part in research and

informed consent was obtained to check for their eligibility in the ongoing studies. In

order to limit coercion, counselors were unaware of whether clients agreed to participate

in research studies. Participation eligibility in the current study was assessed based on the

information collected during the intake screening assessment. Also, only those

individuals who gave their informed consent to participate in research were contacted.

Data collection occurred from September 2014 until April 2015. Data were

collected in a classroom at the treatment facility. Each week, names of newly admitted

clients were gathered from the facility's administrative record. Eligible participants were

contacted and provided with a verbal description of the study within the first 10 days of

their treatment entry. Specifically, participants were asked if they would like to

participate in a study investigating clients' perception and mood related to treatment.

Interested participants were given additional information regarding session length and

compensation. Participants were informed that the session would last approximately 30

minutes, and they would receive either $5 or $7 for their participation based on their

performance on a challenging computer task.

After explaining the purpose and procedures of the study and answering all questions, participants were asked to provide their written informed consent to participate in the study. Given the issue of low reading comprehensive among clients at the selected treatment center, efforts were made to ensure that clients clearly understood the study and their rights as research participants. That is, prior to signing the consent form, participants were asked if they understood all facets of the study, including purpose, procedures, risks, benefits, and compensation, as well as their rights as research participants. The experimenter was able to read the consent form and explain the study to the participants, if needed. Further, participants were assured that their treatment at the center was not contingent upon their participant in the research studies. Following informed consent, participants were assigned with unique subject numbers. Participants were asked to not put their names on any study questionnaires or task in order to maintain anonymity in the study.

As the first task, participants were asked to report their affect on the negative affect subscale of the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). This served as the participants' baseline distress level prior to their engagement in any study tasks. Participants then completed a battery of self-report measures in the following order: intention subscale from the Theory of Planned Behavior Scale (Zemore & Azjen, 2014); motivation subscale from the Circumstances, Motivation, and Readiness Scale (de Leon, 1993), Distress Tolerance Scale (Simons & Gaher, 2005); UPSS-P Impulsive Behavior Scale (Cyders et al., 2014); Barriers to Treatment Inventory (Rapp et al., 2006); as well as provided responses regarding their previous treatment and court-mandated treatment status. These measures assessed baseline distress level,

intention to complete treatment, motivation to change substance use behavior, self-reported psychological distress tolerance, impulsivity level, treatment barriers level, number of previous treatments, and court-mandated treatment status, respectively. The measures were assessed using a secured anonymous web-based survey tool, Qualtrics Labs, Inc. version 2009 (Qualtrics Labs, Inc., 2012). The experimenter was present to answer any questions that participants had, and participants were encouraged to seek assistance with any questions that were unclear.

Following the self-reported measures, participants were asked to engage in a behavioral psychological distress tolerance task, Paced Auditory Serial Addition Task (PASAT; Lejuez et al., 2003) that was also administered on a lab computer. In order to determine whether the change in negative affect related to task termination, participants were asked to rate their level of negative affect before level 1 and after level 2 on the behavioral task. Negative affect included assessment of anxiety, distress, frustration, and irritability, on a scale from 1 indicating "none" to 100 indicating "extreme." Information regarding psychiatric comorbidities, substance use severity, and demographics were obtained from the intake screening assessment. See Appendix A for the study measures.

After completing all parts of the study, participants were asked to sign a receipt indicating how much money they earned. On the receipt, participants provided the experimenter with the address where they wanted their gift card to be mailed. Participants were given a receipt for their records with the phone number to call to request their payment after leaving the treatment center. Clients received gift card compensation for

their time in the study, regardless of whether they completed substance abuse treatment or dropped out of substance abuse treatment.

Participants' treatment completion information was collected from the administrative offices at the treatment center. The study was reviewed by the University Institutional Review Board (IRB). See Appendix B for the IRB approval and the study consent form.

<u>*Measures*</u>

Dependent Variable. The dependent variable was substance abuse treatment dropout, which was coded dichotomously. Consistent with previous studies (Daughters et al., 2005a; Lejuez et al., 2008; Tull et al., 2013), treatment dropout was be defined as: (a) voluntarily leaving treatment against treatment center staff's recommendations; or (b) being asked to leave treatment due to engagement in treatment-interfering behaviors, such as using substances, breaking rules at the treatment facility, violent or aggressive behavior, selling of substances, or having sexual relations with other clients. Information on participants' treatment, including entry date, total number of expected days in treatment, exit date, and reason for leaving the facility, was obtained by contacting the administrative office at the treatment center. All clients, regardless of contract length, were eligible to participant in the study to allow the findings to be generalizable to short-term treatment dropout among African American treatment-seeking substance users.

Independent Variable: Intention. One of the main independent variable in the study was intention to complete substance abuse treatment, which was measured using a

modified version of the Theory of Planned Behavior Scale (TPB scale; Zemore & Ajzen, 2014). This 9-item scale assessed intention, attitudes, subjective norms, and perceived behavioral control to complete treatment program on a 7-point response scale, ranging from 1 "disagree very strongly" to 7 "agree very strongly." This measure has demonstrated acceptable psychometric properties, including construct validity, inter-item correlations, and test-retest reliability in a previous study (Zemore & Ajzen, 2014). In this study, only the intention subscale was administered. Slight modifications were made in the assessment of intention to reflect the minimum number of days required for a contract at the selected treatment center. Whereas participants were asked to report their current level of intention in the original version of this scale, participants were contacted within the first 10 days of their treatment, and they were asked to report their intention retrospectively at the time of entry at the treatment center in the current study.

Moreover, the original intention subscale consisted of three items, but an additional item was included in the current study: "I will probably complete 28 days of treatment at Harbor Light." The new item was regarded as an additional way to encapsulate the underlying construct of intention. The internal consistency of the subscale was examined with and without the fourth item. The original three items of the intention subscale demonstrated better internal consistency in the current study ($\alpha = 0.83$) than the four items ($\alpha = 0.75$). As a result, the scores on the three intention items were averaged to create a total score for intention to complete treatment. Intention was also assessed dichotomously at the mean, such that a score below the mean was considered less than full intent to complete treatment and a score at or above the mean was regarded as full intent to complete treatment.

Independent Variable: Motivation. Another main independent variable in the study was motivation, which was assessed using the motivation subscale of the Circumstance, Motivation, and Readiness (CMR) scale (de Leon, 1993). Although theoretically relevant to the Stages of Change Model, the original scale was developed through interviews conducted with therapeutic community clinical staff, including undergoing treatment-seeking substance users and recovered substance users (de Leon et al., 1994). Motivation was assessed using five items that examined internal recognition of the need to change. Participants were asked to respond on a 5-point scale ranging from "strongly disagree" to "strongly agree." Mean of these five items determined participants' motivation to change substance use behavior. This subscale has demonstrated good internal consistency and predictive validity in previous study (de Leon et al., 2000; Fiorentine & Hillhouse, 2000) and good internal consistency in the current study ($\alpha = 0.85$).

Moderator: Self-Reported Distress Tolerance. Self-reported distress tolerance was measured using the Distress Tolerance Scale (Simons & Gaher, 2005). In this 15-item measure, participants were asked to rate items on a 5-point Likert scale to assess one's perceived ability to withstand negative emotional states. Mean of items measured participants' distress tolerance levels. This scale has demonstrated good internal validity in previous studies (Buckner, Keough, & Schmidt, 2007; Ali et al., 2013) and excellent internal consistency in this study ($\alpha = 0.92$).

Moderator: Behavioral Distress Tolerance. The Paced Auditory Serial Addition Task-Computerized (PASAT-C; Lejuez et al., 2003) is a validated and widely used

behavioral assessment of psychological distress tolerance among substance users (i.e., Daughters et al., 2005a; Brown et al., 2002; Gorka et al., 2012). In this task, numbers were sequentially flashed on a computer screen, and participants were asked to add the currently presented number to the previously presented number before the subsequent number appeared on the screen. The presented numbers ranged from 0 to 20, with no sum greater than 20 to limit the role of mathematical skill in persistence. Participants were told that their score would increase by one point with each correct answer and that incorrect answer or omission would not affect their total score. Moreover, participants heard a loud explosion sound after each incorrect response or nonresponse.

There were three levels of difficulty, each of which titrated to the participants' ability level. The first level lasted two minutes. The second level was more difficult, and it lasted three minutes. The final level was extremely difficulty, and it lasted up to seven minutes. In the final level, participants had the option to quit the task by clicking on the "Quit" button on the screen. To make the task even more distressing, participants were told that their performance on this level of the task would influence how much money they earned at the end of the session. Although participants were not told, the final level automatically terminated after seven minutes (Brown et al., 2002; Lejuez et al., 2003; Tull & Gratz, 2012). Distress tolerance was defined two ways: (1) continuously as latency in seconds to task termination, and (2) dichotomously as "quit" or "no quit", depending on whether the task was terminated on the final level.

To determine whether the change in negative affect during the behavioral task was related to performance on the behavioral task, participants were asked to rate their

level of negative affect, including anxiety, distress, frustration, and irritability prior to

level 1 and after level 2. Each item was rated on a 100-point Likert scale, ranging from 1

indicating "none" to 100 indicating "extreme." A total score was derived by averaging

scores of all these items (Brown et al., 2002; Tull & Gratz, 2012). This measure has

evidenced acceptable internal consistency and construct validity in prior studies (Brown

et al., 2002; Daughters et al., 2005b), as found in the current study with good internal

consistency in level 1 ($\alpha = 0.81$) and level 2 ($\alpha = 0.80$) of the behavioral distress

tolerance task. In addition, the latency between number presentations on level 2 was

captured to examine any potential effect of skill on task persistence.

Potential Confounders. Based on the substance abuse treatment literature, the

following potential confounders were identified: psychiatric comorbidities (Axis I

disorders and Axis II disorders), impulsivity, previous treatment, treatment barriers,

court-mandated treatment, substance use severity, and demographic characteristics.

Assessment of these variables is outlined below. Baseline distress prior to any study task

was examined in relation to task performance on the behavioral distress tolerance task, as

well as treatment dropout.

Baseline Distress. Baseline distress level was measured using a 10-item negative

affect (NA) subscale of the Positive and Negative Affect Schedule (PANAS; Watson et

al., 1988). On a 5-point Likert scale ranging from "very slightly or not at all" to

"extremely," participants indicated their NA, which reflected an individual's subjective

distress and encompassed a number of negative mood states including anger, contempt,

disgust, and guilt. NA positively relates to self-reported stress and poor coping (Clark &

Watson, 1988). Mean score on PANAS-NA represented participant's baseline distress level. This measure provided good internal consistency and test-retest reliability previously (Watson et al., 1988) and good internal consistency in this study ($\alpha = 0.86$).

Psychiatric Comorbidities. Trained interviewers assessed psychiatric comorbidities on Axis I disorders and Axis II disorders during the intake screening assessment with clients. Axis I disorders were indexed on the Structured Clinical Interview for the DSM-IV (SCID-IV; First et al., 1995) for the following disorders: major depressive disorder, bipolar I disorder, psychotic symptoms, panic disorder, social phobia, obsessive compulsive disorder, posttraumatic stress disorder, and generalized anxiety disorder. Participants were diagnosed with (1) current major depressive disorder when they endorsed five or more of the nine symptoms related to depression nearly every day in the two week period in the past month, with at least two of the symptoms being depressed mood and loss of interest or pleasure in daily activities, (2) current bipolar I disorder when they endorsed criteria for major depressive disorder plus three or more of eight symptoms of mania in the prior month or lifetime, (3) current psychotic symptoms when they reported any one of the twelve symptoms in the prior year, (4) current panic disorder when they endorsed six or more of sixteen symptoms pertaining to panic in the prior year, with two symptoms being worry related to panic attacks and abrupt onset of attacks, (5) social phobia when they endorsed five relevant symptoms in the prior year, (6) obsessive compulsive disorder when they endorsed either obsessions or compulsions in the past month, (7) posttraumatic stress disorder when they endorsed nine of the relevant symptoms in the prior month, including two symptoms of stressor (traumatic event and fear helplessness, and horror); at least one or more of five symptoms relating to

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intrusion; three or more symptoms of seven relating to avoidance; two or more of five symptoms relating to negative alterations in cognitions, mood, arousal, and reactivity; and one symptom of functional impairment, and (8) generalized anxiety disorder when they endorsed at least five out of nine symptoms in the past six months, including the symptoms of excessive anxiety and inability to control worry. Axis I mood disorders were set when the disorder was not substance-induced or due to a general medical condition.

Axis II disorders included antisocial personality disorder and borderline personality disorder. The SCID-IV was utilized for assessment of antisocial personality disorder and borderline personality disorder. Antisocial personality disorder and borderline personality disorder were particularly examined because they are prevalent among substance users (Kokkevi, Stefanis, Anastasopoulou, & Kostogianni, 1998; Torrens, Gilchrist, & Domingo-Salvany, 2011). Participants met for antisocial personality disorder when they endorsed at least three of seven symptoms of the disorder plus three of fifteen symptoms of conduct disorder that captured problem behaviors before age 15. Participants were diagnosed with borderline personality disorder when they endorsed five or more of nine symptoms of the disorder. The SCID-IV has demonstrated good intra-rater and test-retest reliability (Williams, Gibbon, First, & Spitzer, 1992). Psychiatric comorbidities was measured as the total number of diagnosed psychiatric disorders, ranging from 0 to 10.

Impulsivity. Impulsivity was indexed by the short English version of the UPPS-P Impulsive Behavior Scale (Cyders et al., 2014). This 20-item inventory measures five

personality pathways to impulsive behavior, including (lack of) premeditation, negative urgency, positive urgency, sensation seeking, and (lack of) perseverance. In this study, the following four subscales were used: lack of premeditation (4 items), negative urgency (4 items), positive urgency (4 items), and lack of perseverance (4 items). Participants were asked to consider their acts/incidents when rating their behavior and attitudes on a 4-point scale ranging from "agree strongly" to "disagree strongly." The mean of the items was used to measure impulsivity. The short version of the UPPS has demonstrated excellent internal consistency, convergent validity, and test-retest reliability (Billieux et al., 2012; Cyders et al., 2014; Whiteside & Lynam, 2001). The internal consistency in the current study was acceptable ($\alpha = 0.68$).

Previous Treatments. Participants were asked to report on their treatment history consisting of the number of times they had previously attended residential treatment programs for drugs or alcohol. Number of previous treatment was measured on a continuous scale.

Treatment Barriers. Barriers to treatment completion were examined using the Barriers to Treatment Inventory (Rapp et al., 2006). This scale assessed an individual's views on barriers to treatment. The scale included seven factors: absence of problem, negative social support, fear of treatment, privacy concerns, time conflict, poor treatment availability, and admission difficulty. In this study, four factors were assessed: absence of problem (6 items), negative social support (5 items), fear of treatment (4 items), and privacy concerns (3 items). The items in each of these subscales were measured on a 5-point Likert scale ranging from "disagree strongly" to "agree strongly." The mean of the

items of these subscales were used to measure treatment barriers. These subscales have

previously demonstrated acceptable internal consistencies, with Cronbach's alphas

ranging from 0.76 to 0.86 (Rapp et al., 2006). In this study, the internal consistency of the

four subscales combined was good ($\alpha = 0.87$).

Court-Mandated Treatment. Participants self-reported whether they were court-

mandated to attend treatment or voluntarily attended treatment (yes versus no). Court-

mandated treatment status was determined at the time of intake screening and validated

using the administrative records. If discrepancy in court-mandated treatment status was

found, then the center's information was utilized in the study.

Substance Use Severity. During the intake assessment, participants reported their

substance use frequency. Substance use severity consisted of drug use frequency in the

past year on a scale ranging from "never" (0) to "4 or more times a week" (5). For the

analysis, this scale was coded as monthly or less versus more than monthly use of drug.

The substance categories included: (a) marijuana, (b) alcohol, (c) cocaine (not crack), (d)

crack, (e) ecstasy, (f) Methamphetamines, (g) sedatives, (h) heroin, (i) illegal

prescriptions, (j) and PCP. Sum of the number of drugs used monthly was regarded as the

substance use severity score. Substance use severity ranged from 0-10.

Demographic Characteristics. During the intake assessment, participants

provided basic demographic information including gender, race/ethnicity, age in years,

education level, monthly income, marital status, and employment status. Gender was

indicated as either male or female. Race/ethnicity was noted as African American,

Caucasian, Asian, American Indian, Hispanic, or Other. Only African Americans were

eligible to participate in the study. Age in years was measured on a continuous scale. Categories for education level included less than 8th grade, completion of 8th grade, some high school, GED, high school graduate, Associate or other technical 2-year degree, Bachelor's degree, Master's degree or higher. During the analysis, education was coded as less than or some high school education, GED, and high school education or higher.[1] Monthly income was measured on a continuous scale. Categories for marital status consisted of never married, married, divorced, separated, living with someone as if married, and widowed. During the analysis, marital status was coded as married/living with someone or unmarried, which consisted of never married, divorced, separated, and widowed. The options for employment included employed but absent, employed but suspended, unemployed, and retired. In the study, employment was coded as employed or unemployed.

See Appendix A for the following study measures: treatment dropout, intention to complete treatment, motivation to change substance use behavior, distress tolerance (self-reported and behavioral), baseline distress, psychiatric comorbidities, previous treatment, impulsivity, treatment barriers, court-mandated treatment, substance use severity, and demographics.

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[1] Education was also examined as less than or some high school education, GED or high school education, and higher than high school education. However, this variable was not included in the analysis due to small cell count observed (n=1) among those who dropped out of treatment and had more than high school education.

Data Analysis Plan

Data were downloaded or entered, as appropriate, and analyzed using SPSS version 21. All self-report data were collected on a lap computer using a secured web-based survey tool, which limited data entry errors.

Descriptive Analysis. Prior to any inference statistics, descriptive analyses were conducted on all study variables to assess descriptive statistics, such as mean, frequency, and correlations among variables. All continuous data were assessed for normality and adjusted as needed to approximate normal distribution. Further, to assess internal consistency of the scales, Cronbach's alphas were calculated for the following scales: intention, motivation, self-reported distress tolerance, baseline distress, impulsivity, and treatment barriers. Internal consistencies of the measures are noted next to the description of measures above.

Bivariate Analysis. The primary independent variables, the moderators, and the potential covariates were examined for their relationship with the dependent variable using chi-square and *t*-test, as appropriate. For cell observation count of less than 5, statistical significance was based on Fisher's Exact test. Any covariate that differed significantly by group was controlled for in subsequent analyses. Covariates were conservatively identified at $p < 0.10$ and included in subsequent regression analyses. Further, repeated measures analysis was performed to determine whether the change in negative affect during the behavioral distress tolerance task was related to task performance. In addition, *t*-test analyses examined whether baseline negative affect

before the study assessment was related to performance on the distress tolerance and the outcome variable.

Multivariate Analysis. In the current study, a series of unadjusted and adjusted logistic regression analyses were conducted to examine substance abuse treatment dropout with and without adjustment of potential confounders.

For Aim 1, separate interaction terms were created: intention (continuous) by self-reported distress tolerance, intention (dichotomous) by self-reported distress tolerance, intention (continuous) by behavioral distress tolerance (continuous), and intention (continuous) by behavioral distress tolerance (dichotomous), intention (dichotomous) by behavioral distress tolerance (continuous), and intention (dichotomous) by behavioral distress tolerance (dichotomous). For unadjusted analysis, intention (dichotomous or continuous) and distress tolerance (self-reported or behavioral) main effects were added in Step 1; and the interaction term corresponding to each analysis was added in Step 2. For adjusted analysis, covariates were added in Step 1, intention (dichotomous or continuous) and distress tolerance (self-reported or behavioral) main effects were added in Step 2; and the interaction term corresponding to each analysis was added in Step 3. If the interaction term was found statistically significant at $p < 0.05$, then the moderating effect of distress tolerance was supported. If the interaction term was found significant, then adjusted simple slope analysis was performed to assess whether the slope of high or low distress tolerance was significant in the relationship between intention and likelihood of treatment dropout.

For Aim 2, separate interaction terms were created: motivation by self-reported distress tolerance, motivation by behavioral distress tolerance (continuous), and motivation by behavioral distress tolerance (dichotomous). Similar to the steps above, motivation and distress tolerance (self-reported or behavioral) main effects were added in Step 1, and the interaction term was added in Step 2 for the unadjusted analysis. For the adjusted analysis, covariates were included in Step 1, motivation and distress tolerance (self-reported or behavioral) main effects were added in Step 2, and the interaction term was added in Step 3. If the interaction term was found statistically significant at $p < 0.05$, then the moderating effect of distress tolerance was supported. If the interaction term was found significant, then adjusted simple slope analysis was performed to assess whether the slope of high or low distress tolerance was significant in the relationship between motivation and likelihood of treatment dropout.

Chapter 4: Results

This chapter presents the findings obtained from the study sample. Data were collected from 86 participants. The original study goal was to collect data from 150 participants, but this number was not achieved due to recruitment difficulties. The sample size of 150 was based on the prior year's count before the study, showing that approximately 20 new clients entered treatment each week at this 128-capacity facility. The refusal rate from previous research for this treatment center ranged from 5.0% to 11.0% (Banducci et al., 2013; Daughters et al., 2005a). Accordingly, data collection was expected to occur over 14 weeks with at least 11 participants recruited per week. However, on average, only about 7 clients completed intake interviews each week over the course of the study, with 27.0% of the clients refusing to participate in any research studies. Moreover, about 5.0% refused to participate in the current study, and 20.0% were found ineligible for the study (17.0% low reading level, 2.0% severe psychotic symptoms, and 1.0% non-African American). The study data were collected over 31 weeks, with an average of 3 clients per week.

Missing Data

All necessary steps were taken to avoid missing data. Self-report data and behavioral assessment of distress tolerance were collected at the same assessment time. Instructions to the participants emphasized anonymity of the study in order to reduce any missing data. All self-report measures were assessed on the web-based survey tool, and participants were asked to click "SKIP" and verify their intent to skip any items. Despite

these efforts, missing data were observed for the following variables: age (4.7%, n = 4), monthly income (9.3%, n = 8), highest education (5.8%, n = 5), marital status (5.8%, n = 5), employment (5.8%, n = 5), and substance use severity (8.1%, n = 7). Preliminary analysis to examine missing data using Fisher's Exact test, as appropriate for cell count less than 5 observations, showed that substance abuse treatment dropout was not statistically related to responses on: age ($p = 1.00$), with 29.3% of respondents dropping out of treatment compared to 25.0% of non-respondents; income ($p = 1.00$), with 29.5% of respondents dropping out of treatment compared to 25.0% of non-respondents; education ($p = 1.00$), with 29.6% of respondents dropping out of treatment compared to 20.0% of non-respondents; marital status ($p = 1.00$), with 29.6% of respondents dropping out of treatment compared to 20.0% of non-respondent; employment ($p = 1.00$), with 29.6% of respondents dropping out of treatment compared to 20.0% of non-respondents; and substance use severity ($p = 1.00$), with 29.1% of respondents dropping out of treatment compared to 28.6% of non-respondents.

Examination of the missing data pattern showed that five participants had missing data on all variables with missing data. Therefore, data from these five participants were excluded from analyses in the study, yielding a new sample size of N = 81. Of these, missing data were noted on income (3.7%, n = 3) and substance use severity (2.5%, n = 2). Mean imputation was performed to estimate these missing values. The sample mean of income, 620.62, was entered for missing income values, and the sample mean of substance use severity, 1.53, was entered for missing substance use severity values.

Descriptive Results

Descriptive data for the sample are presented in Table 1. The majority of the

sample was male (71.6%). Age in years ranged from 19 years to 66 years, with the mean

age was 41.02 years (SD = 12.35). Monthly income ranged from $0.00 to $4,236, with

the average monthly income of $620.62 (SD = 901.08). Half of the sample was high

school graduate or higher (50.6%), followed by some or less than high school (27.2%)

and GED (22.2%). The majority of the sample was unmarried (92.6%) and unemployed

(76.5%), reflecting the low socioeconomic status of the sample.

Table 1. Demographic characteristics of the sample (N=81).

	N	% / Mean(SD)
Sex		
Male	58	71.6%
Female	23	28.4%
Education		
Some or less than high school	22	27.2%
GED	18	22.2%
High school graduate or higher	41	50.6%
Marital status		
Married	6	7.4%
Unmarried	75	92.6%
Employment: Employed		
Employed	19	23.5%
Unemployed	62	76.5%
Age in years (range: 19-66)	81	41.02(12.35)
Monthly income in US dollars (range: 0.00-4,236.00)	81	620.62(901.08)

In the study, 29.6% of the participants (n = 24) dropped out of substance abuse

treatment (7.4% voluntary withdrawal, 19.8% clinical discharge, and 2.5% jail). Table 2

provides information regarding contract length and contract type related to dropout. As

shown, approximately one-third of the dropouts occurred during the first two weeks of

treatment, and one-third of the dropouts occurred during the third week of treatment. The

primary reason for dropping out of treatment was clinical discharge, referring to

treatment termination due to disciplinary reasons.

Table 2. Descriptive of treatment dropout in the sample (n=24).

	n	%
Dropout time		
1-7 days in treatment	1	4.2%
8-14 days in treatment	7	29.2%
15-21 days in treatment	8	33.3%
22-28 days in treatment	2	8.3%
29-35 days in treatment	2	8.3%
36 or more days in treatment	4	16.7%
Dropout reason		
Voluntary withdrawal	6	25.0%
Clinical discharge	16	66.7%
Jail	2	8.3%

A change in policy at the treatment center occurred mid-way through the study,

which prohibited the use of cigarettes among those receiving treatment. More than half

(54.3%) of the sample was recruited after the policy implementation. Chi-square analysis

showed that there was no statistically significant difference in treatment dropout before

and after the smoking policy implementation, (24.3% versus 34.1%, respectively), $\chi^2(1)$

$= 0.92$, $p = 0.34$.

The mean intention score was 6.07 (SD $= 1.56$), and the mean motivation score

was 3.75 (SD $= 1.10$). The normality of all continuous data, namely intention, motivation,

self-reported distress tolerance, behavioral distress tolerance, psychiatric comorbidities,

impulsivity, previous treatment, treatment barriers, substance use severity, age in years,

and monthly income were examined using quantile-quantile plots (QQ-plots). A QQ-plot

compares the sample data on the vertical axis with the normal distribution on the horizontal axis. The QQ-plot is a straight line within sampling error if the data conform to the normal distribution. In the study, intention scores, behavioral distress tolerance scores, and monthly income in dollars were identified as highly skewed. The normality test using the Kolmogorov-Smirnov test confirmed that intention scores [$D = 0.33(81)$, $p < 0.001$] and behavioral distress tolerance scores [$D = 0.37(81)$, $p < 0.001$] were positively skewed, and monthly income in dollars [$D = 0.25(81)$, $p < 0.001$] was negatively skewed. Thus, these scores were log transformed to approximate normal distributions (Aiken and West, 1991). Statistical analyses were conducted using logged scores of intention (range: 0.00 – 1.95, mean = 1.74, SD = 0.41), behavioral distress tolerance (range: 0.00 - 6.04, mean = 5.17, SD = 1.54), and income (range: 0.00 - 8.35, mean = 8.06, SD = 0.98). Descriptive tables provide raw and log-transformed scores to facilitate interpretation.

Bivariate and inferential statistics were performed with both log transformed intention, as well as a dichotomous intention measure created at the mean, such that a score below the mean was regarded as less than full intention to complete treatment and a score at or above the mean was considered as full intention to complete treatment. In the study, less than one-third of the participants (30.9%) had less than full intent to complete treatment and more than two-third of the participants (69.1%) had full intent to complete treatment. Also, as mentioned above, behavioral distress tolerance was examined as both the transformed variable and the dichotomized variable (low versus high distress tolerance).

The mean self-reported distress tolerance was 2.96 (SD = 1.04). Participants persisted on the behavioral distress tolerance task for an average of 297.56 seconds (SD = 167.24) and 39.5% (n = 32) quit the task before the 7-minute expired. Examination of the dichotomous behavioral distress tolerance task showed that more females than males quit the behavioral distress tolerance task prior to task termination (43.5% female versus 37.9% male, respectively); however, this difference was not statistically significant [$\chi^2(1)$ = 0.21, p = 0.65]. Further, a repeated measures analysis indicated that the change in negative affect from prior to level 1 to level 2 of the behavioral distress tolerance task was not related to task termination [$F(1,79)$ = 0.06, p = 0.81]. T-test analysis showed that baseline negative affect prior to any study assessment was not related to task termination [$t(1,79)$ = -0.40, p = 0.69]. Skill on the behavioral distress tolerance task was indexed by latency between number presentations. T-test analysis also showed that there was no significant relationship between skill on behavioral distress tolerance task and task termination [$t(79)$ = 1.54, p = 0.13]. These results indicate that distress tolerance was not related to negative affect prior to study assessment, the change in negative affect during the behavioral task, or skill on the behavioral task.

Bivariate Results

Table 3 and Table 4 provide the descriptive results of study variables by treatment dropout status. As observed in Table 3, chi-square analyses showed that sex [$\chi^2(1)$ = 1.10, p = 0.33] and education [$\chi^2(2)$ = 1.33, p = 0.51] did not vary by treatment dropout. Fisher's Exact Test showed that marital status was not associated with treatment dropout at p = 0.17, but employment was related to treatment dropout at p = 0.05. Substance

abuse treatment dropout was related to employment status such that 35.5% of the unemployed versus 10.5% of the employed dropped out of treatment. Further, t-test analyses noted that neither age in years $[t(79) = 1.58, p = 0.12]$ nor log transformed monthly income $[t(79) = 0.89, p = 0.38]$ was related to treatment dropout.

Table 3. Demographic characteristics by treatment dropout status (N=81).

	n	Completion % / Mean(SD)	n	Dropout % / Mean(SD)	Statistical Test	p-value
Sex					$\chi^2(1)$=1.10	0.33
Male	39	68.4%	19	79.2%		
Female	18	31.6%	5	20.8%		
Highest education					$\chi^2(2)$=1.33	0.51
Some or less than high school	15	26.3%	7	29.2%		
GED	11	19.3%	7	29.2%		
High school graduate or higher	31	54.4%	10	41.7%		
Marital status[a]					-	0.17
Married	6	10.5%	0	0.0%		
Unmarried	51	89.5%	24	100.0%		
Employment[a]					-	0.05
Employed	17	29.8%	2	8.3%		
Unemployed	40	70.2%	22	91.7%		
Age in years (range: 19-66)	57	42.42(12.10)	24	37.71(12.57)	$t(79)$=1.58	0.12
Monthly income (range: $0.00-$4,236.00)	57	674.25(895.16)	24	497.98(922.42)	$t(79)$=0.79	0.43
Log of monthly income	57	8.13(0.38)	24	7.92(1.69)	$t(79)$=0.89	0.38

[a]Fisher's Exact Test was used due to the small cell size of less than 5.

Table 4 shows descriptive results of the continuous study variables by dropout status. There were no differences between those who dropped out of treatment versus those who completed treatment in terms of baseline distress [$t(79) = -0.08$, $p = 0.93$], number of previous residential treatments [$t(79) = 1.46$, $p = 0.15$], psychiatric comorbidities [$t(79) = 0.46$, $p = 0.64$], impulsivity [$t(33.26) = -1.38$, $p = 0.18$], substance use severity [$t(79) = 1.54$, $p = 0.13$], and barriers [$t(79) = -0.04$, $p = 0.97$]. Further, log-transformed intention [$t(79) = 0.36$, $p = 0.72$], motivation [$t(33.11) = 0.98$, $p = 0.33$], self-reported distress tolerance [$t(79) = -1.27$, $p = 0.21$] and log-transformed behavioral distress tolerance [$t(79) = 1.16$, $p = 0.25$] also did not vary by treatment dropout.

Table 4. Descriptive data of the study variables (N=81): Continuous and ordinal variables.

	Scale Range	Completion (n=57) Mean(SD)	Dropout (n=24) Mean(SD)	Statistical Test	p-value
Baseline distress level	1-5	1.69(0.72)	1.70(0.71)	$t(79)=-0.08$	0.93
Number of previous treatments	1-21	2.96(3.11)	1.96(1.99)	$t(79)=1.46$	0.15
Psychiatric comorbidities	0-10	1.39(1.45)	1.21(1.84)	$t(79)=0.46$	0.64
Impulsivity level	1-4	2.69(0.35)	2.84(0.49)	$t(33.26)=-1.38$	0.18
Substance use severity level	0-10	1.62(0.86)	1.31(0.75)	$t(79)=1.54$	0.13
Barriers level	1-5	2.00(0.64)	2.01(0.62)	$t(79)=-0.04$	0.97
Self-reported distress tolerance score	1-5	2.87(0.99)	3.19(1.13)	$t(79)=-1.27$	0.21
Behavioral distress tolerance score[a]	420	306.40(160.65)	276.54(183.83)	$t(79)=0.73$	0.47
Log of behavioral distress tolerance score	0-6.04	5.29(1.37)	4.86(1.88)	$t(79)=1.16$	0.25
Motivation level	1-5	3.84(0.97)	3.54(1.37)	$t(33.11)=0.98$	0.33
Intention level	1-7	6.10(1.51)	6.00(1.71)	$t(79)=0.26$	0.80
Log of intention level	0-1.95	1.75(0.39)	1.71(0.47)	$t(79)=0.36$	0.72

Note: [a]Number in seconds to task termination.

As noted in Table 5, chi-square analysis indicated that treatment dropout did not

differ in terms of court-mandated treatment status [$\chi^2(1) = 0.37$, $p = 0.55$]. Chi-square

analysis also showed that treatment dropout did not vary by behavioral distress tolerance

group [$\chi^2(1) = 0.07$, $p = 0.80$] or intention group [$\chi^2(1) = 0.05$, $p = 0.83$].

Table 5. Descriptive data of the study variables (N=81): Binary variables

	Completion		Dropout		Statistical Test	*p*-value
	n	%	n	%		
Court-mandated treatment					$\chi^2(1)=0.37$	0.55
Yes	35	61.4%	13	54.2%		
No	22	38.6%	11	45.8%		
Behavioral distress tolerance					$\chi^2(1)=0.07$	0.80
Low distress tolerance	22	38.6%	10	41.7%		
High distress tolerance	35	61.4%	14	58.3%		
Intention					$\chi^2(1)=0.05$	0.83
Low intention	18	31.8%	7	29.2%		
High intention	39	68.4%	17	70.8%		

Correlations among continuous study variables are shown in Table 6. Pearson's

correlation displayed that a higher log-transformed intention score was not correlated

with a higher motivation score ($r = 0.04$, $p = 0.74$). Scores on intention ($r = -0.28$, $p =$

0.01) and motivation ($r = -0.33$, $p = 0.003$) were both significantly negatively correlated

to level of treatment barriers, such that more favorable intention and higher motivation

related to lower treatment barriers. Motivation score was also positively correlated to age

in years ($r = 0.34$, $p = 0.002$) and number of previous residential treatments ($r = 0.33$, $p =$

0.003), indicating that higher motivation related to older age and greater number of

previous residential treatments. Self-reported distress tolerance score was positively

correlated with impulsivity level ($r = 0.40$, $p = 0.001$) and negatively correlated with the

number of psychiatric comorbidities ($r = -0.50$, $p < 0.001$), treatment barriers level ($r = -0.29$, $p = 0.01$), and log-transformed monthly income ($r = -0.27$, $p = 0.01$), suggesting that higher self-reported distress tolerance was related to less impulsivity, fewer psychiatric comorbidities, lower level of treatment barriers, and lower monthly income. Log-transformed behavioral distress tolerance score was positively correlated with age in years ($r = 0.27$, $p = 0.02$), such that higher behavioral distress tolerance related to older age. Relations among other variables are also shown in the table.

Table 6. Correlations among study variables (N=81).

	1	2	3	4	5	6	7	8	9	10	11
1. Intention score[a]	1.00										
2. Motivation score	0.04	1.00									
3. Self-reported distress tolerance score	0.08	-0.21	1.00								
4. Behavioral distress tolerance score[a]	0.02	0.13	-0.10	1.00							
5. Number of psychiatric comorbidities	-0.05	0.15	-0.50**	0.19	1.00						
6. Impulsivity score	-0.01	-0.20	0.40**	-0.09	-0.36**	1.00					
7. Substance use severity score	-0.01	0.01	-0.20	0.10	0.29**	-0.19	1.00				
8. Number of previous treatments	0.05	0.33**	0.03	0.10	0.01	-0.32**	0.04	1.00			
9. Barriers score	-0.28*	-0.33**	-0.29*	-0.16	0.16	-0.15	0.06	-0.17	1.00		
10. Age in years	0.06	0.34**	0.05	0.27*	-0.06	-0.22	-0.04	0.31**	-0.31**	1.00	
11. Monthly income[a]	-0.00	0.09	-0.27*	0.02	0.15	-0.14	0.03	-0.07	0.06	-0.02	1.00

Note: *p < 0.05, **p < 0.01; [a]Log-transformed.

The results of bivariate analyses only identified employment as a significant variable related to treatment dropout at *p*-level of 0.05. Based on strong empirical support for psychiatric comorbidities (Bornovalova et al., 2005; Daughters et al., 2009; Tull & Gratz, 2012) and court-mandated treatment status (Maglione et al., 2000; Perron & Bright, 2008) as potential risk factors of treatment dropout among urban African American treatment-seeking substance users, these variables were also controlled in the analyses. Subsequent regression analyses were conducted with and without these covariates in the models.

Prior to examining the interaction effects, intention (continuous), motivation, self-reported distress tolerance, and behavioral distress tolerance (continuous) scores were centered (i.e., each participant's intention, motivation and self-reported distress tolerance, and behavioral distress tolerance scores were subtracted from the means) to allow meaningful and interpretable results.

Intention and Self-Reported Distress Tolerance

The interactive effect of intention (continuous and dichotomous) and self-reported distress tolerance on treatment dropout was examined using hierarchical logistic regression analysis. Table 7 contains the unadjusted main and interacting effects of intention (continuous) and self-reported distress tolerance on treatment dropout. In the unadjusted regression analysis, intention and self-reported distress tolerance were entered in Step 1, and the interaction term of intention by self-reported distress tolerance was entered in Step 2. Neither the first step with main effects [$\chi^2(2) = 1.85$, $p = 0.40$], nor the

final model with interaction effect [$\chi^2(3) = 2.09$, $p = 0.56$] was significant in predicting

treatment dropout.

Table 7. Unadjusted analysis of intention level and self-reported distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=1.85$, $p=0.40$
Intention[a]	-0.28	0.58	0.23	0.76	0.24-2.36	0.64	
Self-reported distress tolerance	0.31	0.24	1.69	1.37	0.85-2.18	0.19	
Step 2							$\chi^2(3)=2.09$, $p=0.56$
Intention[a]	-0.20	0.60	0.11	0.82	0.25-2.66	0.74	
Self-reported distress tolerance	0.32	0.24	1.78	1.38	0.86-2.21	0.18	
Intention by self-reported distress tolerance	0.28	0.57	0.24	1.32	0.44-4.00	0.63	

Note: [a]Intention was a log-transformed continuous measure.

Table 8 shows the adjusted main and interacting effects of intention (continuous)

and self-reported distress tolerance on treatment dropout. In the adjusted logistic

regression analysis, employment, psychiatric comorbidities, and court-mandated

treatment status were entered in Step 1, intention and self-reported distress tolerance were

entered in Step 2, and the interaction term of intention by self-reported distress tolerance

was entered in Step 3. Step 1 with covariates [$\chi^2(3) = 6.06$, $p = 0.11$], Step 2 with main

effects [$\chi^2(5) = 8.45$, $p = 0.13$], and final model with interaction effect [$\chi^2(6) = 10.39$, $p =$

0.11] were not significant models predicting treatment dropout.

Table 8. Adjusted analysis of intention level and self-reported distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=8.45$, $p=0.13$
Employment	-1.79	0.83	4.69	0.17	0.03-0.84	0.03	
Psychiatric comorbidities	-0.04	0.20	0.04	0.96	0.66-1.41	0.85	
Court-mandated treatment	-0.15	0.52	0.08	0.86	0.31-2.40	0.77	
Intention[a]	-0.38	0.63	0.37	0.68	0.20-2.35	0.54	
Self-reported distress tolerance	0.40	0.29	1.94	1.50	0.85-2.65	0.16	
Step 3							$\chi^2(6)=10.39$, $p=0.11$
Employment	-2.15	0.89	5.87	0.12	0.02-0.66	0.02	
Psychiatric comorbidities	-0.05	0.20	0.07	0.95	0.64-1.40	0.80	
Court-mandated treatment	-0.10	0.53	0.04	0.90	0.32-2.56	0.84	
Intention[a]	-0.22	0.66	0.11	0.80	0.22-2.93	0.74	
Self-reported distress tolerance	0.45	0.30	2.25	1.56	0.87-2.80	0.13	
Intention by self-reported distress tolerance	0.90	0.66	1.86	2.47	0.67-9.04	0.17	

Note: [a]Intention was a log-transformed continuous measure.

Next, the unadjusted interactive effect of intention (dichotomous) and self-reported distress tolerance was assessed. Intention and self-reported distress tolerance were entered in Step 1, and the interaction term intention by self-reported distress tolerance was entered in Step 2. Table 9 shows that neither the first step with main effects [$\chi^2(2) = 1.67, p = 0.43$] nor the final regression model with interaction effect significantly predicted treatment dropout [$\chi^2(3) = 1.68, p = 0.64$].

Table 9. Unadjusted analysis of intention group and self-reported distress tolerance predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=1.67$, $p=0.43$
Intention[a]	0.11	0.54	0.04	1.12	0.39-3.21	0.83	
Self-reported distress tolerance	0.30	0.24	1.60	1.35	0.85-2.16	0.21	
Step 2							$\chi^2(3)=1.68$, $p=0.64$
Intention[a]	0.11	0.54	0.04	1.11	0.39-3.21	0.84	
Self-reported distress tolerance	0.27	0.40	0.46	1.31	0.60-2.88	0.50	
Intention by self-reported distress tolerance	0.05	0.50	0.01	1.05	0.39-2.78	0.93	

Note: [a]Intention was a dichotomous variable.

Adjusted analysis of the interactive effect of intention (dichotomous) and self-reported distress tolerance contained employment, psychiatric comorbidities, and court-mandated treatment status in Step 1, intention and self-reported distress tolerance in Step 2, and the interaction term of intention by self-reported distress tolerance in Step 3. Table 10 shows that first step with covariates [$\chi^2(3) = 6.06, p = 0.11$], second step with main effects [$\chi^2(5) = 8.22, p = 0.15$], and the final model with interaction effect [$\chi^2(6) = 9.20, p = 0.16$] did not significantly predict treatment dropout.

Table 10. Adjusted analysis of intention group and self-reported distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=8.22$, $p=0.15$
Employment	-1.83	0.84	4.71	0.16	0.03-0.84	0.03	
Psychiatric comorbidities	-0.04	0.20	0.04	0.96	0.66-1.42	0.85	
Court-mandated treatment	-0.09	0.52	0.03	0.91	0.33-2.53	0.86	
Intention[a]	0.21	0.58	0.13	1.23	0.40-3.82	0.72	
Self-reported distress tolerance	0.42	0.30	2.06	1.53	0.86-2.73	0.15	
Step 3							$\chi^2(6)=9.20$, $p=0.16$
Employment	-2.09	0.89	5.46	0.12	0.02-0.71	0.02	
Psychiatric comorbidities	-0.06	0.20	0.09	0.95	0.64-1.39	0.77	
Court-mandated treatment	-0.01	0.53	0.00	0.99	0.35-2.81	0.99	
Intention[a]	0.13	0.57	0.06	1.15	0.38-3.50	0.81	
Self-reported distress tolerance	0.07	0.46	0.02	1.07	0.44-2.62	0.88	
Intention by self-reported distress tolerance	0.56	0.57	0.99	1.76	0.58-5.34	0.32	

Note: [a]Intention was a dichotomous variable.

Intention and Behavioral Distress Tolerance

The interactive effect of intention (continuous and dichotomous) and behavioral distress tolerance (continuous and dichotomous) on treatment dropout was examined using hierarchical logistic regression analysis. In the unadjusted regression model, intention (continuous) and behavioral distress tolerance (continuous) were entered in Step 1, and the interaction term of intention by behavioral distress tolerance was entered in Step 2. Results from this regression analysis are displayed in Table 11. The first step with

main effects [$\chi^2(2) = 1.40$, $p = 0.50$] and the final model with interaction effect [$\chi^2(3) =$ 1.47, $p = 0.69$] did not significantly predict treatment dropout.

Table 11. Unadjusted analysis of intention level and behavioral distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=1.40$, $p=0.50$
Intention[a]	-0.20	0.57	0.12	0.82	0.27-2.53	0.73	
Behavioral distress tolerance[a]	-0.17	0.15	1.30	0.84	0.63-1.13	0.26	
Step 2							$\chi^2(3)=1.47$, $p=0.69$
Intention[a]	-0.20	0.58	0.11	0.82	0.26-2.58	0.74	
Behavioral distress tolerance[a]	-0.17	0.15	1.25	0.84	0.63-1.14	0.26	
Intention by behavioral distress tolerance	0.08	0.34	0.06	1.09	0.56-2.11	0.81	

Note: [a]Intention and behavioral distress tolerance were log-transformed continuous measures.

In the adjusted regression model, employment, psychiatric comorbidities, and court-mandated treatment status were entered in Step 1, intention (continuous) and behavioral distress tolerance (continuous) were entered in Step 2, and the interaction term of intention by behavioral distress tolerance was entered in Step 3. Table 12 shows that Step 1 with covariates [$\chi^2(3) = 6.06$, $p = 0.11$], Step 2 with main effects [$\chi^2(5) = 7.72$, $p = 0.17$], or Step 3 with interaction effect [$\chi^2(6) = 7.84$, $p = 0.25$] did not significantly predicted treatment dropout.

Table 12. Adjusted analysis of intention level and behavioral distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=7.72$, $p=0.17$
Employment	-1.68	0.81	4.28	0.19	0.04-0.92	0.04	
Psychiatric comorbidities	-0.12	0.18	0.43	0.89	0.63-1.26	0.51	
Court-mandated treatment	-0.28	0.53	0.29	0.76	0.27-2.12	0.59	
Intention[a]	-0.39	0.62	0.40	0.68	0.20-2.28	0.53	
Behavioral distress tolerance[a]	-0.18	0.16	1.27	0.83	0.61-1.14	0.26	
Step 3							$\chi^2(6)=7.84$, $p=0.25$
Employment	-1.70	0.82	4.34	0.18	0.04-0.90	0.04	
Psychiatric comorbidities	-0.12	0.18	0.48	0.88	0.62-1.26	0.49	
Court-mandated treatment	-0.25	0.53	0.22	0.78	0.27-2.21	0.64	
Intention[a]	-0.41	0.64	0.41	0.67	0.19-2.32	0.52	
Behavioral distress tolerance[a]	-0.18	0.16	1.23	0.84	0.61-1.15	0.27	
Intention by behavioral distress tolerance	0.14	0.41	0.11	1.15	0.52-2.54	0.74	

Note: [a]Intention and behavioral distress tolerance were log-transformed continuous measures.

Unadjusted and adjusted regression models were also examined for the interactive effect of intention (continuous) and behavioral distress tolerance (dichotomous). In the unadjusted regression model, intention and behavioral distress tolerance were entered in Step 1, and the interaction term of intention by behavioral distress tolerance was entered in Step 2. Results from this regression analysis are displayed in Table 13. Neither the first model with main effects [$\chi^2(2) = 0.21$, $p = 0.90$], nor the final model with interaction effect [$\chi^2(3) = 0.21$, $p = 0.98$] predicted treatment dropout.

Table 13. Unadjusted analysis of intention level and behavioral distress tolerance group predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=0.21$, $p=0.90$
Intention[a]	-0.21	0.57	0.14	0.81	0.27-2.46	0.71	
Behavioral distress tolerance[b]	0.13	0.50	0.07	1.14	0.43-3.03	0.79	
Step 2							$\chi^2(3)=0.21$, $p=0.98$
Intention[a]	-0.22	0.66	0.11	0.81	0.22-2.92	0.74	
Behavioral distress tolerance[b]	0.13	0.50	0.07	1.14	0.43-3.03	0.79	
Intention by behavioral distress tolerance	0.01	1.32	0.00	1.01	0.08-13.32	1.00	

Note: [a]Intention was a log-transformed continuous measure; [b]behavioral distress tolerance was a dichotomous measure.

For the adjusted regression model, employment, psychiatric comorbidities, and court-mandated treatment status were entered in Step 1, intention (continuous) and behavioral distress tolerance (dichotomous) were entered in Step 2, and the interaction term of intention by behavioral distress tolerance was entered in Step 3. As shown in Table 14, Step 1 with covariates [$\chi^2(3) = 6.06$, $p = 0.11$], Step 2 with main effects [$\chi^2(5) = 6.96$, $p = 0.22$], and Step 3 with interaction effect [$\chi^2(6) = 7.03$, $p = 0.32$] were not significant models for explaining treatment dropout.

Table 14. Adjusted analysis of intention level and behavioral distress tolerance group predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
							$\chi^2(3)=6.06$, $p=0.11$
Step 1							
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
							$\chi^2(5)=6.96$, $p=0.22$
Step 2							
Employment	-1.73	0.82	4.51	0.18	0.04-0.88	0.03	
Psychiatric comorbidities	-0.15	0.18	0.74	0.86	0.61-1.21	0.39	
Court-mandated treatment	-0.32	0.53	0.35	0.73	0.26-2.08	0.55	
Intention[a]	-0.43	0.62	0.47	0.65	0.19-2.20	0.49	
Behavioral distress tolerance[b]	0.39	0.54	0.52	1.48	0.51-4.27	0.47	
							$\chi^2(6)=7.03$, $p=0.32$
Step 3							
Employment	-1.76	0.82	4.55	0.17	0.03-0.87	0.03	
Psychiatric comorbidities	-0.16	0.18	0.78	0.86	0.60-1.21	0.38	
Court-mandated treatment	-0.30	0.54	0.31	0.74	0.26-2.13	0.58	
Intention[a]	-0.33	0.72	0.22	0.72	0.18-2.92	0.64	
Behavioral distress tolerance[b]	0.40	0.54	0.54	1.49	0.51-4.31	0.47	
Intention by behavioral distress tolerance	-0.40	1.48	0.07	0.67	0.04-12.23	0.79	

Note: [a]Intention was a log-transformed continuous measure; [b]behavioral distress tolerance was a dichotomous measure.

In a separate set of regression models, intention (dichotomous) and behavioral distress tolerance (continuous and dichotomous) were examined in predicting the likelihood of treatment dropout. In the unadjusted model, intention (dichotomous) and behavioral distress tolerance (continuous) were entered in Step 1, and the interaction term of intention by distress tolerance was entered in Step 2. Results from this regression analysis are displayed in Table 15. The first step with the main effects [$\chi^2(2) = 1.33$, $p =$

0.51] and final model with interaction effect [$\chi^2(3) = 1.34, p = 0.72$] did not significantly

predict treatment dropout.

Table 15. Unadjusted analysis of intention group and behavioral distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=0.13$, $p=0.51$
Intention[a]	0.11	0.54	0.04	1.12	0.39-3.20	0.84	
Behavioral distress tolerance[b]	-0.17	0.15	1.31	0.84	0.63-1.13	0.25	
Step 2							$\chi^2(3)=1.34$, $p=0.72$
Intention[a]	0.11	0.54	0.04	1.11	0.39-3.19	0.84	
Behavioral distress tolerance[b]	-0.15	0.29	0.26	0.86	0.49-1.53	0.61	
Intention by behavioral distress tolerance	-0.03	0.34	0.01	0.97	0.50-1.89	0.93	

Note: [a]Intention was a dichotomous measure; [b]behavioral distress tolerance was a log-transformed continuous measure.

In the adjusted model, employment, psychiatric comorbidities, and court-

mandated treatment status entered in Step 1, intention (dichotomous) and behavioral

distress tolerance (continuous) were entered in Step 2, and the interaction term intention

by behavioral distress tolerance was entered in Step 3. Results in Table 16 below shows

that Step 1 with covariates [$\chi^2(3) = 6.06, p = 0.11$], Step 2 with main effects [$\chi^2(5) =$

7.34, $p = 0.20$], and the final model with interaction effect [$\chi^2(6) = 7.39, p = 0.29$] were

not significant models for explaining treatment dropout.

Table 16. Adjusted analysis of intention group and behavioral distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=7.34$, $p=0.20$
Employment	-1.66	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.12	0.18	0.45	0.89	0.63-1.26	0.51	
Court-mandated treatment	-0.23	0.52	0.20	0.79	0.29-2.19	0.65	
Intention[a]	0.05	0.56	0.01	1.05	0.35-3.14	0.93	
Behavioral distress tolerance[b]	-0.18	0.16	1.25	0.84	0.61-1.15	0.26	
Step 3							$\chi^2(6)=7.39$, $p=0.29$
Employment	-1.68	0.82	4.20	0.19	0.04-0.93	0.04	
Psychiatric comorbidities	-0.12	0.18	0.50	0.89	0.62-1.26	0.50	
Court-mandated treatment	-0.23	0.52	0.20	0.80	0.29-2.20	0.66	
Intention[a]	0.05	0.56	0.01	1.05	0.35-3.15	0.93	
Behavioral distress tolerance[b]	-0.24	0.31	0.58	0.79	0.43-1.46	0.45	
Intention by behavioral distress tolerance	0.08	0.36	0.05	1.09	0.53-2.21	0.82	

Note: [a]Intention was a dichotomous measure; [b]behavioral distress tolerance was a log-transformed continuous measure.

For unadjusted regression model with intention (dichotomous) and behavioral distress tolerance (dichotomous), intention and behavioral distress tolerance were entered in Step 1, and the interaction term intention by distress tolerance was entered in Step 2. Results in Table 17 show that neither the first step with main effects [$\chi^2(2) = 0.11$, $p = 0.95$], nor the final model with interaction effect [$\chi^2(3) = 0.12$, $p = 0.99$] predicted treatment dropout.

Table 17. Unadjusted analysis of intention group and behavioral distress tolerance group predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=0.11$, $p=0.95$
Intention[a]	0.12	0.53	0.05	1.12	0.40-3.18	0.83	
Behavioral distress tolerance[a]	0.13	0.50	0.07	1.14	0.43-3.00	0.80	
Step 2							$\chi^2(3)=0.12$, $p=0.99$
Intention[a]	0.14	0.70	0.04	1.15	0.29-4.47	0.85	
Behavioral distress tolerance[a]	0.16	0.90	0.03	1.18	0.20-6.93	0.86	
Intention by behavioral distress tolerance	-0.05	1.08	0.00	0.95	0.11-7.91	0.96	

Note: [a]Intention and behavioral distress tolerance were dichotomous measures.

For the adjusted regression model, employment, psychiatric comorbidities, and court-mandated treatment status were entered in Step 1, intention (dichotomous) and behavioral distress tolerance (dichotomous) were entered in Step 2, and the interaction term intention by behavioral distress tolerance was entered in Step 3. Results are shown in Table 18. Step 1 with covariates [$\chi^2(3) = 6.06$, $p = 0.11$], Step 2 with main effects [$\chi^2(5) = 6.51$, $p = 0.26$], and the final model with interaction effect [$\chi^2(6) = 6.66$, $p = 0.35$] were not significant models for predicting treatment dropout.

Table 18. Adjusted analysis of intention group and behavioral distress tolerance group predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=6.51$, $p=0.26$
Employment	-1.71	0.82	4.38	0.18	0.04-0.90	0.04	
Psychiatric comorbidities	-0.16	0.18	0.77	0.86	0.61-1.21	0.38	
Court-mandated treatment	-0.26	0.53	0.24	0.77	0.28-2.17	0.63	
Intention[a]	0.06	0.56	0.01	1.06	0.36-3.14	0.92	
Behavioral distress tolerance[b]	0.35	0.54	0.43	1.42	0.50-4.07	0.51	
Step 3							$\chi^2(6)=6.66$, $p=0.35$
Employment	-1.74	0.82	4.49	0.18	0.04-0.88	0.03	
Psychiatric comorbidities	-0.16	0.18	0.80	0.85	0.60-1.21	0.37	
Court-mandated treatment	-0.27	0.53	0.27	0.76	0.27-2.15	0.61	
Intention[a]	0.23	0.72	0.10	1.25	0.31-5.10	0.75	
Behavioral distress tolerance[b]	0.67	0.98	0.47	1.96	0.29-13.40	0.49	
Intention by behavioral distress tolerance	-0.44	1.14	0.15	0.64	0.07-6.04	0.70	

Note: [a]Intention and behavioral distress tolerance were dichotomous measures.

Motivation and Self-Reported Distress Tolerance

Moreover, the interactive effect of motivation and self-reported distress tolerance on treatment dropout was examined using hierarchical logistic regression analysis. In the unadjusted regression model, motivation and self-reported distress tolerance were entered in Step 1, and the interaction term of motivation by self-reported distress tolerance was entered in Step 2. Results are shown in Table 19 below. Step 1 with main effects was not a significant model [$\chi^2(2) = 2.39$, $p = 0.30$], but the final model with interaction effect

was a significant model for treatment dropout [$\chi^2(3) = 12.80$, $p = 0.01$]. The interaction

between motivation and self-reported distress tolerance significantly predicted the

likelihood of treatment dropout (b = -0.73, Wald = 7.29, $p = 0.01$).

Table 19. Unadjusted analysis of motivation level and self-reported distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=2.39$, $p=0.30$
Motivation	-0.20	0.22	0.77	0.82	0.53-1.27	0.38	
Self-reported distress tolerance	0.26	0.24	1.13	1.30	0.80-2.08	0.29	
Step 2							$\chi^2(3)=12.80$, $p=0.01$
Motivation	-0.06	0.31	0.04	0.94	0.51-1.74	0.85	
Self-reported distress tolerance	0.18	0.30	0.35	1.19	0.66-2.15	0.56	
Motivation by self-reported distress tolerance	-0.73	0.27	7.29	0.48	0.28-0.82	0.01	

The following equation provides the unadjusted odds estimate of treatment dropout:

$$\hat{y}_{dropout} = -1.15 + 0.18x_{DT} - 0.06x_{motivation} - 0.73x_{interact}$$

In this equation, DT denotes self-reported distress tolerance level, motivation refers to

motivation level, and interact refers to the interaction between motivation and self-

reported distress tolerance.

Adjusted logistic regression provided similar results, as shown in Table 20. In the

adjusted model, employment, psychiatric comorbidities, and court-mandated treatment

status were entered in Step 1, motivation and self-reported distress tolerance in Step 2,

and the interaction term of motivation by self-reported distress tolerance was entered in

Step 3. Step 1 with covariates [$\chi^2(3) = 6.06$, $p = 0.11$] and Step 2 with main effects [$\chi^2(5)$

$= 8.87$, $p = 0.11$] were not significant models for explaining treatment dropout. However,

the final model with interaction effect [$\chi^2(6) = 17.42$, $p = 0.01$] significantly predicted the

likelihood of treatment dropout. The interaction between motivation and self-reported

distress tolerance significantly predicted the likelihood of treatment dropout [$b = -0.73$,

Wald $= 6.30$, $p = 0.01$] controlling for employment, psychiatric comorbidities, and court-

mandated treatment status. Also in the final model, employment was marginally

significant association with treatment dropout [$b = -1.70$, Wald $= 3.39$, $p = 0.07$].

Table 20. Adjusted analysis of motivation level and self-reported distress tolerance predicting treatment dropout (N=81).

	B	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=8.87$, $p=0.11$
Employment	-1.76	0.83	4.52	0.17	0.03-0.87	0.03	
Psychiatric comorbidities	-0.03	0.19	0.02	0.97	0.67-1.43	0.89	
Court-mandated treatment	-0.21	0.53	0.16	0.81	0.28-2.30	0.69	
Motivation	-0.22	0.24	0.79	0.81	0.50-1.30	0.37	
Self-reported distress tolerance	0.34	0.30	1.32	1.41	0.79-2.53	0.25	
Step 3							$\chi^2(6)=17.42$, $p=0.01$
Employment	-1.70	0.92	3.39	0.18	0.03-1.12	0.07	
Psychiatric comorbidities	-0.01	0.19	0.00	0.99	0.68-1.44	0.97	
Court-mandated treatment	-0.18	0.56	0.10	0.84	0.28-2.51	0.75	
Motivation	-0.11	0.32	0.11	0.90	0.48-1.70	0.75	
Self-reported distress tolerance	0.34	0.35	0.96	1.40	0.71-2.77	0.33	
Motivation by self-reported distress tolerance	-0.73	0.29	6.30	0.48	0.27-0.85	0.01	

This equation shows the adjusted odds estimates of treatment dropout:

$$\hat{y}_{dropout} = -0.74 - 1.70x_{Employ} - 0.01x_{Psych} - 0.18x_{CM} + 0.34x_{DT}$$
$$- 0.11x_{motivation} - 0.73x_{interact}$$

In this equation, employ refers to employment status, psych refers to psychiatric comorbidities, CM refers to court-mandated treatment status, DT denotes self-reported distress tolerance level, motivation denotes motivation level, and interact refers to the interaction of motivation and self-reported distress tolerance.

To further examine the effect of self-reported distress tolerance, the moderator, on the association between motivation and treatment dropout, two post-hoc regressions were performed incorporating the main effect of motivation, the conditional moderator, and the interaction of the two variables to generate the slope of high distress tolerance (1 SD above the mean) and the slope of low distress tolerance (1 SD below the mean) (Aiken and West, 1991; Holmbeck, 2002). These analyses were performed after controlling for employment status, number of psychiatric comorbidities, and court-mandated treatment status. Results of the simple slope effects are shown in Table 21. Results indicated that higher motivation was associated with decreased likelihood of dropout among individuals with high (b = -0.86, Wald = 4.14, p = 0.04), but not low (b = 0.65, Wald = 1.99, p = 0.16) distress tolerance. The odds of treatment dropout decreased by 58% for every one unit increase in motivation for those with high distress tolerance, controlling for employment, psychiatric comorbidities, and court-mandated treatment status.

Table 21. Probing of the interaction effect of motivation level and self-reported distress tolerance level on treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value
Motivation by high distress tolerance	-0.86	0.42	4.14	0.42	0.19-0.97	0.04
Motivation by low distress tolerance	0.65	0.46	1.99	1.91	0.78-4.71	0.16

Note: Low and high self-reported distress tolerance based on 1 standard deviation (SD) below the mean and 1 SD above the mean.

In addition, Figure 2 contains the graphical illustration of the relationship between motivation and treatment dropout by distress tolerance. The statistical analyses found that motivation level had a statistically significant negative association with the likelihood of treatment dropout among those with high distress tolerance, and the figure below shows that the probability of treatment dropout was highest in substance users with low motivation and high distress tolerance, and in substance users with high motivation and low distress tolerance.
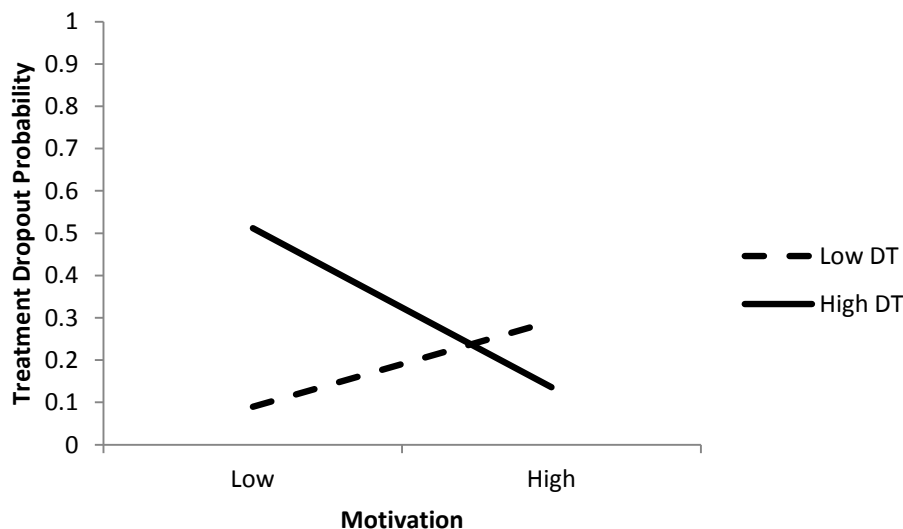

Figure 2. Motivation level and treatment dropout probability by distress tolerance.
Note: DT=Distress tolerance. Low and high distress tolerance and motivation based on 1 standard deviation (SD) below the mean and 1 SD above the mean, respectively.

Motivation and Behavioral Distress Tolerance

The interactive effect of motivation and behavioral distress tolerance (continuous and dichotomous) on treatment dropout was also examined using hierarchical logistic regression analysis. In the unadjusted regression model, motivation and behavioral distress tolerance (continuous) were entered in Step 1, and the interaction term motivation by behavioral distress tolerance was entered in Step 2. Results, as noted in Table 22, showed that the first model [$\chi^2(2) = 2.23$, $p = 0.33$] was not a significant model for treatment dropout, but the final model [$\chi^2(3) = 10.21$, $p = 0.02$] was a significant model for predicting treatment dropout.

Table 22. Unadjusted analysis of motivation level and behavioral distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	*p*-value	Model Statistics
Step 1							$\chi^2(2)=2.23$, $p=0.33$
Motivation	-0.21	0.22	0.95	0.81	0.53-1.24	0.33	
Behavioral distress tolerance[a]	-0.15	0.15	1.00	0.86	0.64-1.16	0.32	
Step 2							$\chi^2(3)=10.21$, $p=0.02$
Motivation	-0.13	0.26	0.26	0.88	0.52-1.47	0.61	
Behavioral distress tolerance[a]	-0.04	0.25	0.02	0.96	0.59-1.58	0.88	
Motivation by behavioral distress tolerance	0.49	0.24	4.12	1.63	1.02-2.60	0.04	

Note: [a]Behavioral distress tolerance was a log-transformed continuous measure.

In the adjusted regression model, employment, psychiatric comorbidities, and court-mandated treatment status were entered in Step 1, motivation and behavioral distress tolerance (continuous) were entered in Step 2, and the interaction term with motivation by behavioral distress tolerance was entered in Step 3. As seen in Table 23,

Step 1 with covariates [$\chi^2(3) = 6.06$, $p = 0.11$] and Step 2 with main effects [$\chi^2(5) = 8.49$, $p = 0.13$] were not significant models for explaining treatment dropout, but Step 3 with interaction effect [$\chi^2(6) = 14.32$, $p = 0.03$] provided a significant model for examining treatment dropout. However, the interaction term of motivation and distress tolerance was not significant in this model ($b = 0.42$, Wald $= 3.22$, $p = 0.07$), suggesting that the conditional effect of distress tolerance was not significant in the relationship between motivation and treatment dropout.

Table 23. Adjusted analysis of motivation level and behavioral distress tolerance level predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=8.49$, $p=0.13$
Employment	-1.66	0.81	4.19	0.19	0.04-0.93	0.04	
Psychiatric comorbidities	-0.09	0.18	0.23	0.92	0.65-1.30	0.64	
Court-mandated treatment	-0.34	0.53	0.40	0.72	0.25-2.03	0.53	
Motivation	-0.26	0.23	1.17	0.78	0.49-1.23	0.28	
Behavioral distress tolerance[a]	-0.16	0.16	0.97	0.85	0.62-1.17	0.33	
Step 3							$\chi^2(6)=14.32$, $p=0.03$
Employment	-1.48	0.83	3.19	0.23	0.05-1.16	0.07	
Psychiatric comorbidities	-0.07	0.18	0.16	0.93	0.68-1.32	0.69	
Court-mandated treatment	-0.19	0.56	0.12	0.83	0.28-2.48	0.73	
Motivation	-0.20	0.28	0.54	0.82	0.48-1.40	0.46	
Behavioral distress tolerance[a]	-0.13	0.26	0.25	0.88	0.53-1.46	0.62	
Motivation by behavioral distress tolerance	0.42	0.24	3.22	1.52	0.96-2.42	0.07	

Note: [a]Behavioral distress tolerance was a log-transformed continuous measure.

In addition, the interactive effect of motivation and behavioral distress tolerance (dichotomous) on treatment dropout was examined using unadjusted and adjusted hierarchical logistic regression analysis. In the unadjusted regression model, motivation and behavioral distress tolerance (dichotomous) were entered in Step 1, and interaction term of motivation by behavioral distress tolerance was entered in Step 2. The results of this analysis are shown in Table 24. Step 1 with main effects [$\chi^2(2) = 1.30, p = 0.52$] and Step 2 with interaction effect [$\chi^2(3) = 4.35, p = 0.23$] were not significant models for explaining the likelihood of treatment dropout.

Table 24. Unadjusted analysis of motivation level and behavioral distress tolerance group predicting treatment dropout (N=81).

	b	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(2)=1.30$, $p=0.52$
Motivation	-0.24	0.22	1.24	0.79	0.51-1.20	0.27	
Behavioral distress tolerance[a]	0.12	0.50	0.05	1.12	0.42-2.99	0.82	
Step 2							$\chi^2(3)=4.35$, $p=0.23$
Motivation	0.14	0.32	0.19	1.15	0.61-2.16	0.67	
Behavioral distress tolerance[a]	0.03	0.52	0.00	1.04	0.37-2.89	0.95	
Motivation by behavioral distress tolerance	-0.78	0.47	2.84	0.46	0.18-1.14	0.09	

Note: [a]Behavioral distress tolerance was a dichotomous measure.

In the adjusted regression model, employment, psychiatric comorbidities, and court-mandated treatment status were entered in Step 1, motivation and behavioral distress tolerance (dichotomous) were entered in Step 2, and the interaction term with motivation by behavioral distress tolerance was entered in Step 3. As observed in Table

25, Step 1 with covariates [$\chi^2(3) = 6.06$, $p = 0.11$], Step 2 with main effects [$\chi^2(5) = 7.98$,

$p = 0.16$], and Step 3 with interaction effect [$\chi^2(3) = 10.52$, $p = 0.10$] were not significant

models for predicting treatment dropout.

Table 25. Adjusted analysis of motivation level and behavioral distress tolerance group predicting treatment dropout (N=81).

	B	SE	Wald	Odds Ratio	95% CI	p-value	Model Statistics
Step 1							$\chi^2(3)=6.06$, $p=0.11$
Employment	-1.65	0.81	4.16	0.19	0.04-0.94	0.04	
Psychiatric comorbidities	-0.16	0.18	0.82	0.85	0.61-1.20	0.36	
Court-mandated treatment	-0.18	0.51	0.13	0.83	0.31-2.25	0.72	
Step 2							$\chi^2(5)=7.98$, $p=0.16$
Employment	-1.72	0.82	4.45	0.18	0.04-0.88	0.04	
Psychiatric comorbidities	-0.11	0.18	0.39	0.90	0.63-1.27	0.53	
Court-mandated treatment	-0.38	0.54	0.50	0.68	0.24-1.97	0.48	
Motivation	-0.28	0.23	1.48	0.76	0.48-1.19	0.22	
Behavioral distress tolerance[a]	0.37	0.54	0.47	1.45	0.50-4.20	0.50	
Step 3							$\chi^2(6)=10.52$, $p=0.10$
Employment	-1.77	0.84	4.41	0.17	0.03-0.89	0.04	
Psychiatric comorbidities	-0.09	0.18	0.25	0.92	0.65-1.29	0.62	
Court-mandated treatment	-0.26	0.56	0.22	0.77	0.26-2.29	0.64	
Motivation	0.06	0.33	0.04	1.07	0.56-2.03	0.85	
Behavioral distress tolerance[a]	0.31	0.57	0.30	1.36	0.45-4.15	0.59	
Motivation by behavioral distress tolerance	-0.74	0.48	2.42	0.48	0.19-1.21	0.12	

Note: [a]Behavioral distress tolerance was a dichotomous measure.

In sum, results of the study did not provide support for the moderating effect of

self-reported distress tolerance or behavioral distress tolerance (continuous or

dichotomous) on the relation between intention (continuous or dichotomous) and

substance abuse treatment dropout. No support was found for the moderating effect of

behavioral distress tolerance (dichotomous or continuous) on the relation between

motivation and substance abuse treatment dropout. However, statistically significant

results were observed for the conditional effect of self-reported distress tolerance with

motivation on substance abuse treatment dropout.

Chapter 5: Discussion

Summary of the Findings

Despite a need to increase substance abuse treatment completion rates in urban African American treatment-seeking substance users, there is a paucity of research in this area to guide the intervention and prevention efforts. A deeper understanding of the conditions influencing substance abuse treatment dropout is necessary for the development and modification of existing programs aimed to reduce substance abuse treatment dropout. Thus, the current study aimed to examine underlying factors pertaining to substance abuse treatment dropout among urban African American treatment-seeking substance users. Specifically, the study aimed to explore whether (1) urban African American treatment-seeking substance users with more favorable intention to complete substance abuse treatment are less likely to drop out of treatment if they evidence higher distress tolerance compared to those with lower distress tolerance, and (2) urban African American treatment-seeking substance users with higher motivation to change substance use behavior are less likely to drop out of treatment if they exhibit higher distress tolerance compared to those with lower distress tolerance.

Distress tolerance was hypothesized to have a modifying role on intention and treatment dropout, as well as motivation and treatment dropout. Partial support for the hypotheses was found in the current study. Findings showed that urban African American substance users with higher motivation to change substance use behavior were at a lower risk for treatment dropout if they had higher distress tolerance, but not if they evidenced

lower distress tolerance. Results indicated that individuals with low motivation and high

distress tolerance, as well as individuals with high motivation and low distress tolerance

had the greatest risk for treatment dropout. These findings suggest that both higher

motivation and higher distress tolerance may be necessary components for substance

abuse treatment retention.

The findings did not show that the relationship between more favorable intention

to complete treatment and treatment dropout was modified by distress tolerance. There

are differences between intention and motivation that should be highlighted.

Conceptually, intention and motivation are theoretical constructs derived from two

different theories, namely the Theory of Planned Behavior and the Stages of Change

Model, respectively. While intention pertains to an individual's readiness to perform a

given behavior, motivation reflects an individual's contemplation that there is a problem

and preparation to change the problem behavior. It is also important to note that intention

items measured readiness to complete substance abuse treatment at the treatment center

where the data were collected. In contrast, motivation did not assess motivation to

complete treatment. Instead, the items on this measure referred to motivation to change

the problem behavior of substance use. As motivation to change behavior does not

correspond to motivation to attend or complete treatment (DiClemente et al., 1999), there

are underlying differences between the two constructs. The evidence of a significant

interacting effect of distress tolerance with motivation, but not intention, suggests that the

recognition of substance abuse problem behavior and desire to seek help for this behavior

may be more powerful in interacting with perceived ability to tolerate distress and

decreasing treatment dropout than the readiness to go through a substance abuse treatment program.

The significant finding of the interacting role of distress tolerance with motivation on treatment dropout was only observed with one form of distress tolerance, specifically self-reported distress tolerance. Based on the conceptualized differences of the two modes of distress tolerance, such that self-reported distress tolerance refers to perceived ability to tolerate negative affect and behavioral measure of distress tolerance indexes actual ability to persist in goal-oriented behavior while experiencing distress (Leyro et al., 2010), both self-reported and behavioral distress tolerance measures were included in the study. A lack of statistical finding using both forms of distress tolerance measure, self-reported and behavioral distress tolerance, is not surprising given that different modes of distress tolerance are weakly associated (McHugh et al., 2011). However, previous support is available for behavioral distress tolerance as a better indicator of treatment dropout than self-reported distress tolerance (Daughters et al., 2005a), yet this study found statistical significance with self-reported distress tolerance. As motivation was also a self-reported measure, perceived motivation to change behavior and perceived ability to tolerate negative affect may be more related and stronger in predicting treatment dropout.

Moreover, previous research has identified intention (Zemore & Ajzen, 2014) and motivation (de Leon et al., 1994) as significant predictors of treatment retention and completion, but this study did not find support for a significant association of intention with treatment dropout nor a significant association of motivation with treatment dropout. The discrepant findings may be due to several reasons. Previous study that employed

similar intention measure to assess treatment dropout (Zemore & Ajzen, 2014) was conducted among predominately White, non-residential treatment-seeking substance users, as opposed to African American residential-treatment seeking substance users examined in this study. Also, the previous study noted a dropout rate of approximately 55% compared to approximately 30% observed in this study. The non-consistent findings between the previous study and this study suggest that the effect of intention and treatment completion may vary by race/ethnicity and across treatment settings. Another difference that may explain the inconsistent finding between the previous study and this study in regard to intention is the exclusion criterion. The previous study excluded individuals from participating in the study if they were mandated to attend treatment for a non-violent, drug possession offense. This study did not make such an exemption, as it attempted to limit exclusion criteria to allow generalizability of the findings across treatment-seeking substance users.

In addition, in this study, the items on the original intention scale were modified to reflect the treatment context in the study sample. Specifically, the items included a time period for treatment completion corresponding to the minimum number of days on a contract (i.e., treatment completion of at least 28 days), as it was probable that treatment length could affect intention level. Also, participants were asked to retrospectively report their intention level at the time of entry into the treatment facility rather than reporting their current level of intention. Retrospective reporting may have incorporated recall bias, which may have affected the results. However, participants were only allowed to be contacted after the intake screening and eligibility check, and recruitment efforts were made within ten days of entry to limit any recall bias.

With regard to motivation, this study did not observe a significant association of motivation with treatment dropout as noted in previous studies (de Leon et al., 1994; Simpson et al., 1995). The differences in study samples and measures between previous studies and this study may explain the inconsistent findings. Prior work on motivation is based on sample characteristics that are not representative of the current study sample, such as larger sample size with a smaller proportion of African American substance users (de Leon et al., 1994; Simpson et al., 1995). The effect of motivation on treatment outcome may differ in different populations. In fact, one of the arguments for the development of the Theory of Planned Behavior Scale consisted of the lack of generalizability of the Stages of Change-based measures across treatment settings.

Further, motivation can be assessed as internal and/or external motivation. The measure used to assess motivation in this study only consisted of internal motivation to change substance use behavior. Internal motivation is influenced by cognitive, emotion, and physical factors (e.g., distress, dissatisfaction, desire to change, etc.); whereas, external motivation is affected by extrinsic pressures and consequences (e.g., social support, employment, legal coercion, etc.; Rosen et al., 2004). Although the current study included a motivation measure that contained items pertaining to internal motivation, it is often difficult to isolate the effect of internal motivation from external pressure. Indeed, previous work on motivation and substance abuse treatment is based on measures consisting of both internal and external motivation (Hampton et al., 2011; Shields et al., 2014), such as the Treatment Motivation Questionnaire (Ryan et al., 1995).

While previous studies on urban African American substance users have not identified employment as an important indicator of treatment dropout (Daughters et al., 2005b; Lejuez et al., 2008), in this study, employed individuals were marginally significantly less likely to dropout out of treatment than unemployed individuals in the adjusted model. Given the previous finding that severity of employment problem in substance users relates to greater likelihood of remaining in treatment at 30 days (Choi et al., 2013), it may be that employed substance users have higher motivation to complete treatment for their substance use problem and then return to their jobs. Further, returning to work may be contingent about successfully completing treatment.

Consistent with previous research (Daughters et al., 2005a; Daughters et al., 2005b; Lejuez et al., 2008), impulsivity, previous treatment, substance use severity and demographics, such as gender, age, and education level, were not associated with treatment dropout. Although psychiatric comorbidities and court-mandated treatment status were judged to be important confounders and controlled during analyses based on previous research indicating that treatment dropout significantly varies with respect to major depressive disorder, social phobia disorder, antisocial personality disorder, and borderline personality disorder (Bornovalova et al., 2005; Daughters et al., 2009; Martinez-Raga et al., 2002; Trull et al., 2000; Tull & Gratz, 2012), as well as court-mandated treatment status (Lejuez et al., 2008; Maglione et al., 2000), these associations were not supported by the bivariate analysis in this study. In this study, psychiatric comorbidities was a composite measure consisting of the total number of disorders, including mood disorders, anxiety disorders, antisocial personality disorder, and

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borderline personality disorder. There may be specific disorders that place individuals at greater risk for treatment dropout.

Although court-mandated treatment status has not been consistently identified as a significant factor related to substance abuse treatment outcome, it has been repeatedly noted as a theoretically relevant factor that may influence treatment outcome. Therefore, researchers have attempted to account for the effect of court-mandated treatment status on treatment dropout, especially when conducting research on individuals who are legally coerced to attend substance abuse treatment (Tull et al., 2012). It has been argued that substance users who are court-mandated to attend treatment are more likely to complete treatment to avoid parole violations or the legal consequences related to leaving treatment (Longshore & Teruya, 2006; Young, Fluellen, & Belenko, 2004).

It is interesting that negative correlations were noted between intention and barriers, motivation and barriers, as well as self-reported distress tolerance and barriers, such that more favorable intention, higher motivation and higher distress tolerance related to less barriers. These correlations suggest that intention, motivation, and distress tolerance levels may be related to experiences with barriers. Although literature on barriers related to residential substance abuse treatment dropout among urban African American treatment-seeking substance users is scarce, some specific reasons for not receiving illicit drug treatment in the past year among individuals aged 12 and older who needed treatment have been identified using a national dataset (Center for Behavioral Health Statistics and Quality, 2014). Results show that approximately one in five individuals who made an effort to get treatment in the past year did not receive illicit drug

treatment because these individuals were not ready to stop using drugs, and one in ten did

not receive illicit drug use treatment because these individuals were concerned about

treatment having a negative effect on their jobs.

Implications

Within the context of limitations, there are several implications of the current

study that need to be highlighted. The findings collected from this study may potentially

be used to inform substance abuse treatment programs. The finding that higher level of

motivation relates to reduced likelihood of treatment dropout among urban American

African substance users with higher distress tolerance, but not lower distress tolerance,

suggests that individuals who enter substance abuse treatment with higher level of self-

awareness of their substance use problem and a strong desire to change their substance

use behavior may not necessarily be able to receive adequate substance abuse treatment if

they lack the skills to deal with negative affect. In order to assess the risk level of

treatment dropout among clients who enter residential substance abuse treatment,

treatment programs may adopt an early assessment tool to identify those at risk for

treatment dropout and provide targeted intervention to those individuals.

An individual with higher motivation level, but lower distress tolerance, may

benefit from efforts targeting distress tolerance skills or coping strategies to reduce

negative affect in the given context. Some interventions already exist that target distress

tolerance and coping skills among individuals with drug and alcohol use disorders. One

such available intervention is the Skills for Improving Distress Tolerance (SIDI)

(Bornovalova, Gratz, Daughters, Hunt, & Lejuez, 2012). Another appropriate

intervention to develop coping skills is the Mindfulness-Based Relapse Prevention (MBRP) program (Bowen et al., 2009).

Moreover, individuals with lower motivation and higher distress tolerance may also be provided with intervention to increase motivation. Increasing motivation to change one's behavior may be accomplished through Motivational Interviewing (Miller, W.R., & Rollnick, 1991). As motivation is a dynamic process, motivation level fluctuates over the course of treatment. Therefore, substance abuse treatment programs may benefit from frequent assessments of motivation levels among treatment-seeking substance users to monitor motivation levels throughout the course of treatment. In addition, given the finding that motivation level and distress tolerance are both important factors for reducing the likelihood of treatment dropout, interventions aimed at reducing treatment dropout among residential treatment-seeking substance users may benefit from incorporating components of both distress tolerance and motivation strategies.

Lastly, the finding that employment has a slight associated with less likelihood of treatment dropout among substance users in this sample suggests that employment can potentially influence treatment outcome. As such, treatment programs may reduce treatment dropout by incorporating basic job training and employment information, such as job skills development (e.g., technology, problem solving, communication, etc.), career counseling, and job listing services.

Limitations

Several limitations are of note in the current study. Results of the study were based on a smaller sample size than the originally planned sample size. The anticipated sample size was 150, but analyses were limited to 81 participants. The proposed sample size of 150 was determined through power analysis calculated using alpha-level of 0.05, power of 0.80, estimated effect sizes derived from previous studies (Daughters et al., 2005a; Zemore & Ajzen, 2014), plus the study covariates. The sample size obtained through power analysis was an estimate, as the study variables examined with treatment dropout in this study were assessed through several different modes and scales (e.g., continuously and dichotomously coded variables) that have not been previously examined, and only covariates significant with treatment dropout at $p < 0.10$ were included in the actual analyses along with any covariate that has been consistently identified as a confounder for treatment dropout. The non-significant main effects of intention and motivation on treatment dropout may be due to inadequate power in the study. Thus, future research may replicate the study design with a larger sample.

Further, intention to complete treatment was assessed retrospectively after participants had already started their treatment. Ideally, this measure should be collected upon entry into the treatment facility to limit any recall bias. Also, the study used a modified version of the intention scale to assess intention to complete substance abuse treatment. Although the original intention scale to measure intention to complete substance abuse treatment was developed using primarily White non-residential treatment-seeking substance users, no investigation was conducted to assess the scale's

psychometric properties and applicability in African American residential treatment-seeking substance users. Future research is encouraged to conduct formative research with African American substance users and other minority substance users, as well as with substance users across treatment settings, such as detoxification programs, long-term residential treatment setting, and short-term residential treatment setting, to create a modified version of the scale with improved psychometric properties.

As motivation measure only consisted of internal motivation to change substance use behavior, future research may assess specific types of internal versus external motivational factors and examine whether both internal and external motivation interact with distress tolerance in predicting treatment dropout. Future research may also examine the differences in treatment dropout by specific type of psychiatric disorder, as well as specific substance use disorder.

Given that both motivation and self-reported distress tolerance were self-reported measures in the study, it is important to consider the influence of common method variance that may have influenced the interrelationships among variables. The non-significant and near zero correlations between several self-report variables in the study suggest that method variance is of little concern. Also, the anonymity of the web-based survey may have limited response biases, such as social desirability. Nonetheless, future research may utilize multimethod approach to replicate the findings and incorporate advanced statistical strategies to control for method variance, such as partial correlation technique (Lindell & Whitney, 2001) that requires a marker variable that is theoretically unrelated to the study variable.

Lastly, the sample in the study does not represent of all residential treatment facilities in the United States. Given that treatments vary across substance abuse treatment programs, findings from this study may not generalize to other residential substance users. However, the current study included urban African American treatment-seeking substance users who are at an increased risk for substance use problems, including substance abuse treatment dropout. Understanding the complex relations among factors in urban African American treatment-seeking substance users that place these individuals at higher risk for treatment dropout is essential for the development of effective programs to reduce treatment dropout.

Conclusion

Evidence has consistently shown that completion of a residential substance abuse treatment program is a vital component for improved substance use outcomes (SAMHSA, 2009). In addition to improvement in substance use problems, completion of treatment also decreases adverse physical, psychological, and societal outcomes (Hubbard et al., 2003; Simpson et al., 1997; NIDA, 2012). The findings of this study indicating that higher motivation and higher distress tolerance are important for reducing the risk of substance abuse treatment dropout among urban African American treatment-seeking substance users is a significant addition to past work on addressing substance abuse treatment dropout. Substance abuse treatment programs may benefit by screening motivation and distress tolerance levels among individuals entering treatment and identify individuals with increased risk for treatment non-completion. These individuals

can be provided with specific interventions that reduce their treatment dropout, and

subsequently, improving their treatment outcomes.

Appendix A

Study Measures

Dependent Variable: Treatment Dropout

1. When did the client begin treatment at Harbor Light? (Date)

2. When did the client leave treatment at Harbor Light? (Date)

3. Did the client complete his/her treatment at Harbor Light? (Yes/No)

4. What was the reason for leaving Harbor Light?

      i.   Voluntary withdrawal

      ii.   Transfer

      iii.   Non-compliance

      iv.   Transition

      v.   Completed

      vi.   Medical discharge

      vii.   Counselor discharge

      viii. Clinical discharge

      ix.   Other (specify): _____

Note: This measure was collected from the administrative records at the treatment center.

Main Independent Variable: Intention

Intention Subscale from the Theory of Planned Behavior Scale (Adapted from Zemore & Ajzen, 2014)

Instructions: Many questions in this survey make use of rating scales with 7 places. Please click the number that best describes your opinion when you began this treatment program. Please read each question carefully.

1. When I began my treatment, my opinion was "I will try to complete at least 28 days of my treatment at Harbor Light."

Disagree very strongly: _1_ : _2_ : _3_ : _4_ : _5_ : _6_ : _7_ : Agree very strongly

2. When I began my treatment, my opinion was "I plan to complete at least 28 days of my treatment at Harbor Light."

Disagree very strongly: _1_ : _2_ : _3_ : _4_ : _5_ : _6_ : _7_ : Agree very strongly

3. When I began my treatment, my opinion was "I intend to complete at least 28 days of my treatment at Harbor Light."

Disagree very strongly: _1_ : _2_ : _3_ : _4_ : _5_ : _6_ : _7_ : Agree very strongly

4. When I began my treatment, my opinion was "I will probably complete at least 28 days of my treatment at Harbor Light."

Disagree very strongly: _1_ : _2_ : _3_ : _4_ : _5_ : _6_ : _7_ : Agree very strongly

Note: The intention subscale was modified to reflect 28 days of treatment completion at Harbor Light. Item number 4 was added to the scale.

Motivation Subscale from the Circumstances, Motivation, and Readiness Scale (de Leon, 1993)

Instructions: How you feel can have a powerful effect on treatment. These feelings include your circumstances, the problems in your life, your feelings about yourself, and your feelings about treatment. Carefully consider each of the questions below and indicate how closely they describe your own thoughts and feelings.

Choose the number that best describes your response.

1 **Strongly Disagree**	2 **Disagree**	3 **Neither Agree or Disagree**	4 **Agree**	5 **Strongly Agree**	9 **Not Applicable**			
1. Basically, I feel that my drug use is a very serious problem in my life.			1	2	3	4	5	9
2. Often I don't like myself because of my drug use.			1	2	3	4	5	9
3. Lately, I feel if I don't change, my life will keep getting worse.			1	2	3	4	5	9
4. I really feel bad that my drug use and the way I've been living has hurt a lot of people.			1	2	3	4	5	9
5. It is more important to me than anything else that I stop using drugs.			1	2	3	4	5	9

Moderator: Behavioral Distress Tolerance

Note: The Paced Auditory Serial Addition Test _(_PASAT; Lejuez et al., 2003) was

downloaded from the following website:

http://www.addiction.umd.edu/CAPERWebSite/downloads.html.

Distress Tolerance Scale (DTS; Simons & Gaher, 2005)

Instructions: Think of times that you feel distressed or upset. Select the item from the menu that best describes your beliefs about feeling distressed or upset.

	STRONGLY AGREE	AGREE A LITTLE	NEITHER AGREE NOR DISAGREE	DISAGREE A LITTLE	STRONGLY DISAGREE
1. Feeling distressed or upset is unbearable to me.	1	2	3	4	5
2. When I feel distressed or upset, all I can think about is how bad I feel.	1	2	3	4	5
3. I can't handle feeling distressed or upset.	1	2	3	4	5
4. My feelings of distress are so intense that they completely take over.	1	2	3	4	5
5. There's nothing worse than feeling distressed or upset.	1	2	3	4	5
6. I can tolerate being distressed or upset as well as most people.	1	2	3	4	5
7. My feelings of distress or being upset are not acceptable.	1	2	3	4	5
8. I'll do anything to avoid feeling distressed or upset.	1	2	3	4	5
9. Other people seem to be able to tolerate feeling distressed or upset better than I can.	1	2	3	4	5
10. Being distressed or upset is always a major ordeal for me.	1	2	3	4	5
11. I am ashamed of myself when I feel distressed or upset.	1	2	3	4	5
12. My feelings of distress or being upset scare me.	1	2	3	4	5
13. I'll do anything to stop feeling distressed or upset.	1	2	3	4	5
14. When I feel distressed or upset, I must do something about it immediately.	1	2	3	4	5
15. When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels.	1	2	3	4	5

Negative Affect Subscale from the Positive and Negative Affect Schedule (PANAS;

Watson et al., 1988)

Instructions: This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to the word. Indicate to what extent *you have felt this way today*. Use the following scale to record your answers.

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

_____irritable

_____distressed

_____ashamed

_____upset

_____nervous

_____guilty

_____scared

_____hostile

_____jittery

_____afraid

Potential Covariate: Psychiatric Comorbidities

Note: The Structured Clinical Interview for DSM-IV (SCID; First et al., 1997) is

accessible for download via the following website:

http://www.scid4.org/revisions/download_pdf.html.

Potential Covariate: Previous Treatments

1. How many **times** in your life have you been treated in an <u>inpatient facility</u> for drugs or alcohol? _____

UPPS Impulsive Behavior Scale (Cyders et al., 2014)

Instructions: Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you Agree Strongly click 1, if you Agree Somewhat click 2, if you Disagree somewhat click 3, and if you Disagree Strongly click 4. Be sure to indicate your agreement or disagreement for every statement below.

	Agree Strongly	Agree Some	Disagree Some	Disagree Strongly
1. I generally like to see things through to the end.	1	2	3	4
2. My thinking is usually careful and purposeful.	1	2	3	4
3. When I am in great mood, I tend to get into situations that could cause me problems.	1	2	3	4
4. Unfinished tasks really bother me.	1	2	3	4
5. I like to stop and think things over before I do them.	1	2	3	4
6. When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
7. Once I get going on something I hate to stop.	1	2	3	4
8. Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
9. I tend to lose control when I am in a great mood.	1	2	3	4
10. I finish what I start.	1	2	3	4
11. I tend to value and follow a rational, "sensible" approach to things.	1	2	3	4
12. When I am upset I often act without thinking.	1	2	3	4
13. When I feel rejected, I will often say things that I later regret.	1	2	3	4
14. Others are shocked or worried about the things I do when I am feeling very excited.	1	2	3	4
15. I usually think carefully before doing anything.	1	2	3	4
16. I tend to act without thinking when I am really excited.	1	2	3	4

Potential Covariate: Treatment Barriers

Absence of Problem, Negative Social Support, Fear of Treatment, and Privacy Concerns
Subscales from the Barriers to Treatment Inventory (Rapp et al., 2006)

Instructions: Please indicate on a five-point scale how much you believe that each barrier would affect your treatment. The five-point scale includes: 1 = *disagree strongly***; 2 =** *disagree***; 3 =** *uncertain***; 4 =** *agree***; and 5 =** *agree strongly***.**

1 = Disagree Strongly
2 = Disagree
3 = Uncertain
4 = Agree
5 = Agree Strongly

1. I do not think I have a problem with drugs.	1	2	3	4	5
2. No one has told me I have a problem with drugs.	1	2	3	4	5
3. My drug use is not causing any problems.	1	2	3	4	5
4. I do not think treatment will make my life better.	1	2	3	4	5
5. I can handle my drug use on my own.	1	2	3	4	5
6. I do not think I need treatment.	1	2	3	4	5
7. I will lose my friends if I go to treatment.	1	2	3	4	5
8. Friends tell me not to go to treatment.	1	2	3	4	5
9. People will think badly of me if I go to treatment.	1	2	3	4	5
10. Someone in my family does not want me to go to treatment.	1	2	3	4	5
11. My family will be embarrassed or ashamed if I go to treatment.	1	2	3	4	5
12. I have had a bad experience with treatment.	1	2	3	4	5
13. I am afraid of what might happen in treatment.	1	2	3	4	5
14. I am afraid of the people I might see in treatment.	1	2	3	4	5
15. I am too embarrassed or ashamed to go to treatment.	1	2	3	4	5
16. I do not like to talk in groups.	1	2	3	4	5
17. I hate being asked personal questions.	1	2	3	4	5
18. I do not like to talk about my personal life with other people.	1	2	3	4	5

Potential Covariate: Court-Mandated Treatment

Are you court-mandated to attend treatment at Harbor Light?

Yes

No

Note: This data was collected during the screening assessment and verified using the

administrative records at the treatment center.

Potential Covariate: Substance Use Severity

	Never	One Time	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
1. About how often did you use marijuana in the past 12 months/year?	0	1	2	3	4	5
2. About how often did you use alcohol in the past 12 months/year?	0	1	2	3	4	5
3a. About how often did you use cocaine in the past 12 months/year?	0	1	2	3	4	5

3b. What was your most common route of administration?
    0) intranasal
    1) injection, i.v.
    2) smoked						

4. About how often did you use ecstasy in the past 12 months?	0	1	2	3	4	5
5. About how often did you use methamphetamine (speed, crystal, crank) in the past 12 months/year?	0	1	2	3	4	5
6. About how often did you use sedatives in the past 12 months/year?	0	1	2	3	4	5
7a. About how often did you use opioid (heroin, morphine, methadone, percocet) in the past 12 months/year?	0	1	2	3	4	5

7b. What was your most common route of administration?
    0) intranasal
    1) injection, i.v.
    2) smoked						

8. About how often did you use PCP in the past 12 months/year?	0	1	2	3	4	5

Note: Substance use severity data was collected during the screening assessment. This information was only obtained for those participants who provided consent to participate in the study.

Potential Covariate: Demographics

1. **Age**: _____

2. **Sex**: ____ Female
   ____ Male

3. **Marital/ Relationship Status**:
   ___ (1) Never married
   ___ (2) Married
   ___ (3) Divorced
   ___ (4) Separated
   ___ (5) Living with someone as if married
   ___ (6) Widowed

4. **Ethnicity/Race**: please check all that apply
   ___ (1) White/Caucasian   ___ (4) Hispanic/Latino
   ___ (2) Black/African American   ___ (5) Native American/American India
   ___ (3) Asian/Southeast Asian   ___ (6) Other: _____

5. **Education** (the highest grade or degree you have completed)
   ___ (1) Less than 8th Grade   ___ (5) G.E.D
   ___ (2) 1st to 8th Grade   ___ (6) Associate or Other Technical Degree
   ___ (3) Some High School   ___ (7) College Graduate (Bachelor's Degree)
   ___ (4) High School Graduate   ___ (8) Graduate or Professional Degree

6. **Total Family/Household Monthly Income**: $ _____

7. **Employment status** in the 30 days prior to treatment
   ___ (1) employed, but absent due to illness (i.e., substance use)
   ___ (2) employed, but temporarily suspended
   ___ (3) Unemployed
   ___ (4) Retired

Note: Demographic measure was collected during the screening assessment. This data was only obtained for those participants who provided consent to participate in the study.

Appendix B

IRB Approval

DATE: July 14, 2014

TO: Bina Ali
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [624895-2] Perception and Mood Related to Treatment
REFERENCE #:
SUBMISSION TYPE: Response/Follow-Up

ACTION: APPROVED
APPROVAL DATE: July 14, 2014
EXPIRATION DATE: July 10, 2015
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 7

Thank you for your submission of Response/Follow-Up materials for this project. The University of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure which are found on the IRBNet Forms and Templates Page.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of July 10, 2015.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

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If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

Generated on IRBNet

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Consent Form

University of Maryland College Park

Page 1 of 3   *Initials* _____ *Date* _____

Project Title	Perception and Mood Related to Treatment
Purpose of the Study	This research is being conducted by Bina Ali at the University of Maryland, College Park under the supervision of Drs. Carl Lejuez and Kerry Green. The purpose of this study is to understand how opinions about treatment and mood relate to clients' treatment outcome.
Procedures	This study will be done on a computer. You will be asked about you opinions and mood. For example, you may be asked how you relate to this item: "When I began my treatment, my opinion was 'I plan to complete my treatment at Harbor Light.'" You may also be asked how you relate to this item: "I can't handle feeling distressed or upset."

You will also be asked to participate in a challenging computer game. This game involves adding numbers between 0 and 20. There are three levels in this game. Each level gets more difficult. Your payment in this study will depend on how well you do on this game. The study session will last about 30 minutes.

The research team will also get your treatment information from the administrative offices at the treatment center. Treatment information includes your treatment entry date, exit date, and reason for leaving the treatment. You will receive a grocery gift care between $5 and $7 for your participation in the study. You payment in this study will depend on how well you do on the computer game.

If at any time you have questions about the study, please discuss them with the experimenter. If at any time you would like to leave the study, you are free to do so. Your participation in this study is voluntary. Your participation does not affect your treatment at the center. |
| Potential Risks and Discomforts | There may be some risks from participating in this study. Risks include study participation at the treatment center, feeling discomfort while completing the study tasks, and giving sensitive data. These risks will be reduced in the following ways:

(1) Study participation at the treatment center: The administrative staff and your counselor will not know if you agree to participate in this study or not. Your participation will not affect your treatment at the center. Your participation in this study is voluntary.

(2) Discomfort during the study: You will be asked to answer questions about your opinions and mood. You may feel uncomfortable when answering these questions. You may also feel frustrated when completing the computer game. These feelings are only temporary. If you experience discomfort, then please discuss your concerns with the experimenter. You may also talk to your counselor at the treatment center. |

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	(3) Sensitive data: We will collect sensitive information, such as information about when you began and end your treatment. All information will be kept safe. Your name will not be put on any data. We will place a unique subject number on all your data. All electronic data will be kept on password-protected computers. Other collected data will be kept in a locked cabinet in our lab at the University of Maryland, College Park. If you have any questions or concerns about the study, then please discuss these issues with the experimenter.
Potential Benefits	There are no direct benefits from participation in this study. The knowledge from this study will help future research on substance abuse treatment. Results from this study may also help create more appropriate and successful treatment programs.
Confidentiality	We will do our best to keep your personal information safe. (1) Your name will only be put on the consent form, recruitment list, and payment receipt. (2) We will place a unique subject number on all your data. (3) We will take the data from the treatment center to the lab at the University of Maryland, College Park at the end of each day. (4) All information will be kept on password-protected computers. Only the research team will have access to the data. (5) No one at Harbor Light will have access to your responses or know about your participation. If we write a report or article about this research project, we will do our best to protect your identity. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if it comes to our attention that you or someone else is in danger or if we are required to do so by law. Your identifying links will be destroyed 10 years after the conclusion of data collection for the study.
Compensation	You will receive a grocery gift card between $5 and $7. Your payment will depend on how well you do on the computer game. You will be asked to give us the address where you would like your gift card to be mailed. We will mail your gift card after you leave the treatment center. We will provide you with a copy of your receipt. The receipt will have the phone number to call to request your payment after they leave treatment. You will be responsible for any taxes assessed on the compensation. ☐ Check here if you expect to earn $600 or more as a research participant in UMCP studies in this calendar year. You must provide your name, address and SSN to receive compensation. ☐ Check here if you do not expect to earn $600 or more as a research participant in UMCP studies in this calendar year. Your name, address, and SSN will not be collected to receive compensation.
Right to Withdraw and	Your participation in this research is completely voluntary. You may

Questions	choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. Your decision to participate or not participate will have no effect on your treatment at the Harbor Light center.
	If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:
	Bina Ali, MPH **2103 Cole Field House** **College Park, MD, 20742**
	or
	Carl Lejuez, Ph.D. **2103 Cole Field House** **College Park, MD, 20742** **(301) 405-0899**
Participant Rights	If you have questions about your rights as a research participant or wish to report a research-related injury, please contact: **University of Maryland College Park** **Institutional Review Board Office** **1204 Marie Mount Hall** **College Park, Maryland, 20742** **E-mail: irb@umd.edu** **Telephone: 301-405-0678** This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.
Statement of Consent	Your signature indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. You will receive a copy of this signed consent form. If you agree to participate, please sign your name below.
Signature and Date	**NAME OF PARTICIPANT [Please Print]**	
	SIGNATURE OF PARTICIPANT	
	DATE	

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